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Hybrid Genetic Swarm

Private Cloud using Eucalyptus

Highlights

Encrypted Cloud Databases

Scheduling for Cloud Computing

Discovering Thoughts, Inventing Future

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Secure DBaaS Model for Accessing Encrypted Cloud Databases

By P Jagadeeswaraiah & M.R. Pavan Kumar
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Abstract- Cloud computing has recently emerged being a compelling paradigm that pertains to managing and delivering services over the web. The particular prevalent problem connected with cloud is confidentiality, security, as well as reliability etc., in which how the cloud provider assures. To recognize this, a novel architecture is usually introduced that will integrates cloud database services and as well executing concurrent operations on encrypted information. Also a new homomorphic encryption algorithm will likely be incorporated to offer confidentiality as well as concurrent execution of various SQL operations. This will be the first option supporting quite a few distributed clienteles to access encrypted cloud databases. One of main thing is that it eliminates advanced proxies in between cloud user and provider. The performance on the architecture is usually calculated by means of theoretical and practical results which are subjected to TPC-C benchmark standard tools for a number of clients as well as network latencies.

Keywords: *cloud, security, homomorphic encryptions, confidentiality.*

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Secure DBaaS Model for Accessing Encrypted Cloud Databases

P. Jagadeeswaraiah[α] & M. R. Pavan Kumar[σ]

Abstract- Cloud computing has recently emerged being a compelling paradigm that pertains to managing and delivering services over the web. The particular prevalent problem connected with cloud is confidentiality, security, as well as reliability etc., in which how the cloud provider assures. To recognize this, a novel architecture is usually introduced that will integrates cloud database services and as well executing concurrent operations on encrypted information. Also a new homomorphic encryption algorithm will likely be incorporated to offer confidentiality as well as concurrent execution of various SQL operations. This will be the first option supporting quite a few distributed clienteles to access encrypted cloud databases. One of main thing is that it eliminates advanced proxies in between cloud user and provider. The performance on the architecture is usually calculated by means of theoretical and practical results which are subjected to TPC-C benchmark standard tools for a number of clients as well as network latencies.

Keywords: cloud, security, homomorphic encryptions, confidentiality.

I. Introduction

In a cloud era, critical data is placed in infrastructure of third parties services assuring the protection and confidentiality may be the prior importance. By which the cloud provides as well as the third parties services has the availability of accessing the confidential information from the clients. So the original plain data is available by the trusted parties as well as remaining untrusted context data should be encrypted. There are many solutions ensuring the confidentiality for storage as a service but confidentiality from the dbaas continues to be in naive stage.

The architecture design is motivated because of the multiple and independent clients to perform the operations within the secured data because of the SQL statements, which could modify the database structure. Database as a service is an important and operational technique enabling

IT providers to provide database functionality being a service to number of consumers. The propose architecture provides the property of making the independent and parallel operations for the remote encrypted database from any geographically located clients, in any unencrypted database setup. In the proposed system we have been not including any intermediate proxy relating to the client and the particular cloud provider. The Secure database as a service is actually immediately applicable to any DBMS as it doesn't require any modifications for the cloud database. Along with the other part regarding architecture is tailored for the homomorphic encryption algorithmic process that provides confidentiality by implementing various computations on data.

A huge set of tests on real cloud platforms elucidates that Secure DBaaS is straight away applicable to any package as a result of it needs no modification on the cloud data services. Other studies where ever the proposed design is subjected to the TPC-C standard benchmark tools for various clients and network latencies shows which the performance of synchronic read and write procedures does not modify Secure DBaaS database structure. Thus suggested architecture provides security by applying the homomorphic encryption on the information of clients along with the response time with the read/write operations may decrease as for the reason that entire database is usually encrypted. Overall the conclusions of paper are crucial because for the first time demonstrates the applicability of encryption to cloud database services in terms of performance and overheads.

II. Related Work

Secure DBaaS gives several unique features that differentiate it from earlier work in the field of security intended for remote databases services.

- It assures files secrecy by enabling some sort of cloud database server to execute concurrency SQL operations (not only read/write) over encrypted files.
- It provides the availability, elasticity, and scalability of the original cloud dbaas because it does not require any proxy server.
- Response times are affected by cryptographic overheads for most of SQL operations are masked by network latencies.
- It does not involve a reliable proxy because tenant data and metadata saved by the cloud database are usually encrypted.

Cryptographic systems and secure storage options represent the earliest works in this field. We don't depth the many documents and products (e.g.,

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Sporc, Sundr, and Depot) because they cannot support computations on protected data.

L. Ferretti proposed an architecture that reduces the risk for any intermediary part, thus achieving availability and scalability just like that of unencrypted cloud database services. Advantages are Guarantees file consistency in scenarios during which independent clients simultaneously execute SQL requests, and the structure from the database can end up being modified. Reduced isolation quantities for multi-version systems have not been characterized before despite being implemented in several products and the drawbacks are concurrent modifications from the database structure are generally supported but at the expense of higher overhead as well as stricter transaction remote location levels. In that paper, we present Crypt DB because intermediate server involving the client and server delivers confidentiality for request that uses DBMSs. Crypt DB's approach should be to execute queries in excess of encrypted data as well as the key that SQL runs on the well-defined set while operators. The benefits are, Crypt DB stops the DBA through learning private files. Crypt DB ensures your confidentiality of logged out users data. Their drawbacks are generally Throughput penalty arises while tracing your database using MYSQL servers is looks like its modest or unassembled. This paper overcomes the issue between a client as well as the server while processing the clients issue request. In that paper we advise, using multiple service providers so that you can store data. This process may use the decomposition algorithm that the columns of a database can be split across your server. This algorithm should match the following:

- Privacy constraints should not be violated
- Workload should be reduced

Various approaches guarantee that database as a service provides clients seamless mechanisms to produce, store, and access their databases in the host site. NetDB2, a database model on-line provides a useful mechanism for organizations to acquire data management like a service. Database as an email finder service makes the benefit of additional overhead of remote access to data, an infrastructure to guarantee data privacy, and program design. Data privacy can be achieved in different levels by utilizing encryption techniques with both software and hardware levels. NetDB2 model also performs create/remove furniture, views, triggers, crawls, abstract data varieties, SQL queries, create and call user defined functions and stored procedures, producing and deleting crawls, etc. Some dbms engines offer the chance of encrypting knowledge at the file system level through the alleged Transparent Information Security feature. This feature makes it possible to construct a reliable dbms over untrusted storage. The dbms is trusted and decrypts knowledge before their use. This approach is not applicable to the dbms situation regarded by SecureDBaaS. Since we believe that the cloud company is untrusted.

The reliance on the trusted proxy in which it allows for the implementation of secure dbaas, and it is applicable in order to multitier world-wide-web applications, which might be their major focus. This causes various drawbacks. Considering that the proxy is actually trusted, its functions are not outsourced for an untrusted fog up provider. The proxy is supposed to always be implemented as well as managed because of the cloud renter. Availability, scalability as well as elasticity of the whole safeguarded dbaas support are then bounded by means of availability, scalability as well as elasticity of the trusted proxy that becomes 1 point involving failure and also a system bottleneck. Given that high availability, scalability as well as elasticity are one of many foremost factors that lead to the adopting of fog up services, this limitation hinders your applicability for the cloud data source scenario. Secure DBaaS solves this challenge by making clients connect directly to the DBaaS, without necessity of any kind of intermediate part and without introducing completely new bottlenecks as well as single factors of failing.

A new proxy based buildings requiring which any buyer operation should move through one advanced beginner server isn't suitable to help cloud-based situations, in which in turn multiple clientele, typically sent out among various locations, need concurrent use of data stored from the same DBMS. On the other hand, SecureDBaaS sustains distributed clientele issuing self-sufficient and contingency SQL operations towards same database and perhaps to identical data. SecureDBaaS expands our early studies exhibiting that files consistency can be guaranteed for some operations simply by leveraging concurrency isolation mechanisms carried out in DBMS engines, and discovering the lowest isolation level important for those claims. Moreover, we have now consider in theory and experimentally a total set regarding SQL procedures represented by the TPC-C typical benchmark, besides multiple clients and different client-cloud circle latencies that have been never evaluated from the literature.

III. Motivation

Sustaining critical data in the hands of a cloud provider is often a challenging one that is certainly associated with secrecy. There exist quite a few encryption techniques now available that provides the particular guarantee of safety measures and availability for data. To provide each of the security features to data there were different types of architectures; algorithms are increasingly being developed and are in naive stage. Feasibility, functionality and performance can be calculated using typical tested like emulab and cloud

providers like amazon EC2, windows azure, Xeround , Rackspace etc.,

IV. Problem Definition

Today most of the information is being maintained in the hands of cloud providers. But how far the data is secure and available whether the data is in use, in motion and at rest. This is a critical phenomenon and there exists several possible solutions too. Also how securely cloud databases can be accessed.

V. Problem Statement

Secure DBaaS is made to allow numerous and separate clients to connect to cloud without intermediate server. Data and also metadata are generally encrypted just before upload towards the cloud. Multiple cryptography techniques are widely-used to transform plain word into encrypted data. Table titles and the column names can also be encrypted inside cloud database using safety scheme. The device supports geographically spread clients to connect directly a great encrypted cloud database. The client can execute concurrent query processing encrypted sources. Homomorphic encryption operations like RSA, ElGamal, Pailler systems are widely-used in the machine. Concurrent data and data structure changes are allowed for the cloud sources. The following problems are generally identified through the existing method.

- Database structure modification increases the computational overhead
- Data integrity verification is not performed
- Access control mechanism is not provided
- Query submission is not secured

VI. Problem Formulation

With cloud research technology, there were plenty of important policy issues may include like privacy, secrecy, anonymity, government surveillance, stability etc., Of these entire most crucial one will be security, through which how the cloud provider assures. Generally cloud computing features different class of customers that features academicians, everyday users and also enterprises etc., in which in turn their motivation is always to move about the cloud regarding deploying software, managing assets etc. Security standpoint is different perspective regarding for different consumers. Suppose regarding enterprises high performance may become criteria whereas for academicians it can be on the performance regarding computing. Like this several issues occur in the cloud.

VII. Architecture Design

The architecture layout of Secure DBaaS is made up of one or more client devices with SecureDBaaS installed and also cloud database. The below Fig. 1 gives entire architecture. This certain client is likely for the text of anyone to this particular cloud dbaas to be able to perform SQL operations. To combat the confidentiality troubles, many cryptographic strategies are widely-used to convert plaintext data to encrypted variety for storing inside cloud database. The architecture consists of five types of information. Such as

Plain data: the informative content provided by the client users.

Encrypted data: the encrypted data that is stored in the cloud database.

Plain metadata: all the information required by the clients to manage encrypted data on the cloud database.

Encrypted metadata: the encrypted metadata that is stored in the cloud database.

Master key: the encryption key of the encrypted metadata. This key is distributed to all the clients.

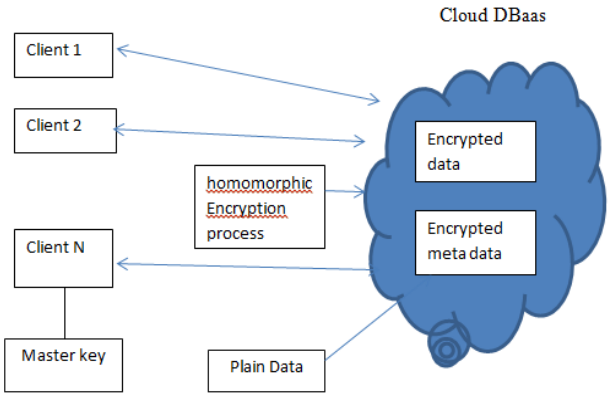

Figure 1 : Secure DBaaS architecture

Here we assume that tenant firm acquires the cloud database service from untrusted dbaas provider. The tenant then deploys a number of machines and installs the Secure DBaaS consumer on each of them. This consumer allows the user to touch this cloud dbaas to manage it, just read and compose data, as well as to build and change the repository tables after creation. We assume the identical security model that is commonly adopted where tenant users usually are trusted, the circle is untrusted plus the cloud provider is honest-but-curious, cloud service operations are accomplished correctly, however tenant info confidentiality threat. The info managed through Secure DBaaS includes plaintext data, encrypted data, metadata, and encrypted metadata. Plaintext data incorporate information that your tenant wants to store and process remotely inside cloud dbaas. To stop an untrusted impair provider by violating confidentiality of tenant data located in simple form, Secure DBaaS switches into multiple cryptographic approaches to

transform plaintext data into encrypted tenant data and encrypted tenant data set ups because even the names from the tables and of these columns has to be encrypted. Secure DBaaS consumers produce also a set of metadata composing of information forced to encrypt decrypt data as well as other administration info. Even metadata usually are encrypted and stored inside cloud dbaas. Secure DBaaS moves away from existing architectures which store just tenant data inside cloud repository, and spend less metadata inside client appliance or separated metadata involving the cloud database along with a trusted proxy. When contemplating scenarios exactly where multiple consumers can access the identical database at the same time previous solutions are quite inefficient. Solutions depending on a trustworthy proxy tend to be feasible; nonetheless they introduce a head unit bottleneck which reduces access, elasticity and scalability involving cloud repository services. Secure DBaaS proposes a new approach exactly where all data and metadata usually are stored throughout the cloud database. Secure DBaaS consumers can retrieve the mandatory metadata from the untrusted repository through SQL statements, so which multiple instances of the Secure DBaaS consumer can access to the untrusted impair database independently while using the guarantee from the same access and scalability properties of typical cloud dbaas. Encryption strategies for tenant data and modern solutions intended for metadata administration and safe-keeping are explained.

VIII. Problem Solving

a) Homomorphic Encryption Applied to Cloud Security

When the data transferred in the cloud we employ standard encryption approaches to secure the actual operations along with the storage from the data. Our essential concept seemed to be to encrypt the data before deliver it to the Cloud provider. But a final one should decrypt info at each and every operation. The client will likely need to provide the actual private key to the server (Cloud provider) to decrypt data before performing the calculations required, that may affect the actual confidentiality and privacy regarding data stored from the Cloud. Here we execute operations on protected information without decrypting them, which may provide the exact same results after calculations like we have worked on the raw data. Homomorphic Encryption programs are used to accomplish operations on encrypted data without knowing the private key (without decryption), the customer is the only real owner of the secret key.

Def.: An encryption is homomorphic, if from Enc(x) and Enc(y) it is possible to compute Enc(f (x, y)), where f can be: +, ×, ⊕ and without using the private key .One of the Homomorphic encryption we recognize, according to the operations that enables to evaluate on information, the additive Homomorphic encryption (only additions of the data) could be the Pailler and Goldwasser-Micalli cryptosystems, and the multiplicative Homomorphic encryption (only products on data) could be the RSA and El Gamal cryptosystems.

Suppose Ek is an encryption algorithm with key k.

Dk is a decryption algorithm with key k.

Dk (Ek (p) × Ek (q)) = p×q OR Enc (x⊗y) = Enc(x) ⊗ Enc(y)

Dz (Ez (n) × Ez (m)) = n+m OR Enc (x⊕y) = Enc(x) ⊗ Enc(y)

The first property is called multiplicative homomorphic encryption, and the second is additive homomorphic encryption. An algorithm is fully homomorphic if both properties are satisfied simultaneously.

b) Homomorphic Encryption (RSA cryptosystem)

The below given fig 2 gives us homomorphic encryption.

Let $n = pq$ where p and q are primes. Pick a and b such that $ab \equiv 1 \pmod{\phi(n)}$. n and b are public while p, q and a are private.

$$e_K(x) = x^b \bmod n$$

$$d_K(y) = y^a \bmod n$$

The Homomorphism: Suppose p1 and p2 are plaintexts. Then,

Ek(p1) Ek(p2) = $(p1)_b(p2)_b$

mod n = $(p1p2)_b$ mod n = Ek (p1p2)

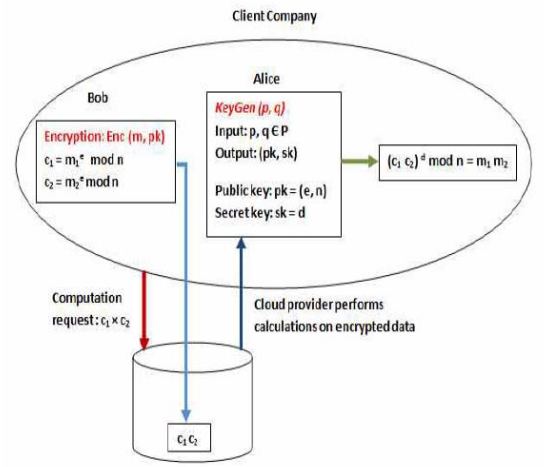

Figure 2 : Multiplicative homomorphic encryption

c) Sequential SQL Operations

We identify the SQL operations in Secure DBaaS simply by considering an initial simple scenario by which we assume that the cloud repository is utilized by a single client. Our goal suggestions to highlight the principle processing measures; we usually do not think about performance optimizations and also concurrency.

The first connection on the client with the cloud DBaaS is for authenticated functions. Secure DBaaS utilizes standard authentication and also authorization mechanisms provided by the authentic DBMS server. After the authentication, a individual interacts with the cloud database over the Secure DBaaS purchaser. Secure DBaaS analyzes the original operation to be able to identify that tables could happen and to be able to retrieve their metadata from your cloud repository. The metadata are decrypted over the master key and their particular information is employed to translate the plain SQL into a query which operates for the encrypted repository. Translated operations are then executed with the cloud database above the encrypted data. Because there can be a one-to-one messages between Plaintext and encrypted text, it may be possible to prevent a reliable database individual from being able to view or editing some renter data simply by granting restricted privileges in some furniture. User privileges might be managed directly with the untrusted and also encrypted cloud database. The outcomes of the particular translated dilemma that contains encrypted renter data and also metadata tend to be received with the SecureDBaaS purchaser, decrypted and also delivered towards the user. The complexity on the translation process is dependent upon any type of SQL affirmations depends on the type of SQL statement.

d) Concurrent SQL Operations

The support to concurrent delivery of SQL claims issued by numerous separate clients is unquestionably one of the most critical advantages of Secure DBaaS regarding state-of-the-art solutions. Our architecture should guarantee consistency among protected tenant data and protected metadata because broken or out-of-date metadata would prevent clients from decoding protected tenant data producing lasting data losses. A rigorous analysis of the probable problems and answers linked to concurrent SQL procedures on protected tenant data obtainable in the web extra material. Here, we remark the importance of unique two classes of claims that are reinforced by Secure DBaaS: SQL procedures perhaps not producing improvements to the database structure, such as for example for instance read, create, and update; procedures involving variations of the database structure through development, removal and adjustment of database tables. In cases known with a fixed database structure, Secure DBaaS allows clients to concern concurrent SQL instructions to the protected cloud database without presenting any new consistency problems regarding unencrypted databases. After metadata collection, a plaintext SQL order is translated in to one SQL order running on protected tenant data. As metadata don't modify, a consumer may read them when and cache them for further uses, hence increasing performance. Secure DBaaS is the first architecture that allows concurrent and consistent accesses even when you can find procedures that might change the database structure. Such cases, we have to guarantee the consistency of data and metadata through solitude degrees, like the photo solitude that people show may benefit most consumption scenarios.

IX. Experimental Results

We display the applicability of Secure DBaaS to various cloud dbaas alternatives by employing and managing protected database procedures on emulated cloud infrastructures. The current edition of Secure DBaaS prototype supports Postgre SQL, My SQL, and SQL Server relational databases. As an initial result, we could discover that porting Secure DBaaS to various DBMS requires modest improvements related to the database connector, and small adjustments of the database.

We carry out a group of tests that assesses the performance and the overheads of our prototype. We utilize the benchmark performance tools like Dell benchmark factory, Monyog, Hammer DB that provide us a managed atmosphere with many machines, ensuring repeatability of the tests for the variety of situations to take into account in terms of workload types, quantity of clients, and network latencies. Because the workload model for the repository, we reference the TPC-C standard. The dbms machine is MYSQL 5.6 used on an Intel processor having 8 GB of RAM. Clients are connected to the machine through a LAN, wherever we can present arbitrary system latencies to emulate WAN connections which can be normal of cloud services. The studies evaluate the expense of encryption, examine the reaction times of simple versus secured repository procedures, and analyze the effect of system latency. We consider two TPC-C certified databases with 10 warehouses that have exactly the same quantity of tuples: simple tuples include 1,046 MB information, while Secure DBaaS tuples have size equal to 1024 MB as a result of encryption overhead. Both databases use repeatable study (snapshot) isolation stage.

To evaluate response times, the customer steps the performance times of the 44 SQL commands to the TPC-C benchmark. Response times are plotted on the histogram of the Fig. 3 that has a logarithmic Y-axis. TPC-C procedures are grouped on the foundation of the school transaction: Order Status, Stock Level, Payment, and New Order, Delivery. Out of this determine, we are able to enjoy that the response time is less than 3 ms for many procedures, and under 1 ms for nearly all procedures.

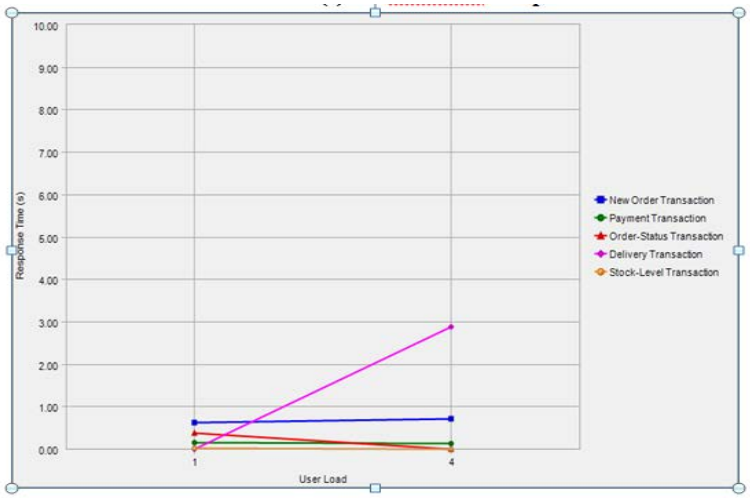

Figure 3 : Response times of TPC-C benchmark operations grouped by the transaction class

The next set of experiments is done that gives the throughput for increasing variety of concurrent customers in contexts characterized by 40 ms system latencies, respectively. The below given fig 4 represents TPC-C performance that corresponds to variety of users. Y -axis presents the amount of committed TPC-C transactions each and every minute executed by the clients. The traits of the Secure DBaaS lines are close to those of the initial TPC-C repository, therefore demonstrating that Secure DBaaS protected repository does not influence scalability regarding the simple database. Much more essential, the system latencies tend to mask cryptographic overheads for numerous clients. Like, the overheads of Secure DBaaS with 40 concurrent customers diminish from 20 per cent in a 40-ms situation to 13 percent in a sensible situation. That effect is essential as it confirms that Secure DBaaS is just a legitimate and useful solution for guaranteeing confidentiality in real cloud services.

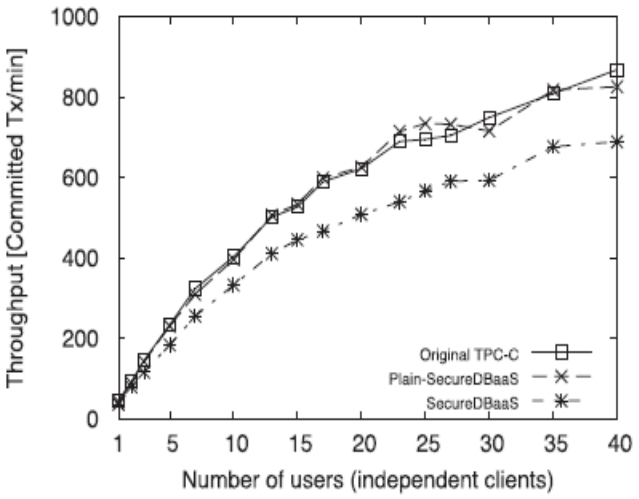

Figure 4 : TPC-C performance

X. Conclusion

We propose an impressive architecture that guarantees confidentiality of data in public cloud databases. Unlike state-of-the-art strategies, our solution doesn't rely on an intermediate proxy that people think about a simple level of disappointment and a bottleneck decreasing supply and scalability of normal cloud database services. A big part of the research contains alternatives to guide concurrent SQL operations (including claims adjusting the database structure) on secured knowledge given by heterogeneous and probably geographically distributed clients. The proposed architecture doesn't need changes to the cloud database, and it's instantly appropriate to current cloud dbaas. We find no theoretical and sensible limits to extend our treatment for other tools and to incorporate new encryption algorithms .Its price observing that experimental benefits based on the TPC-C benchmark standard shows that the performance effect of information encryption on result time becomes minimal because it's negligible by network latencies that are typical of cloud scenarios. Specifically, concurrent study and create procedures that maybe not change the framework of the secured database trigger minimal overhead.

XI. Acknowledgments

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Hybrid Genetic Swarm Scheduling for Cloud Computing

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Abstract- Cloud computing ensures access to shared resources and common infrastructure, offering services on demand over a network for operations to meet changing business needs. Scheduling is a prominent activity that is executed in a cloud computing environment. To increase cloud computing work load efficiency, tasks scheduling is performed to get maximum profit. In cloud, high communication cost prevents task schedulers from being applied in large scale distributed environments. Cloud environment system scheduling is NP-complete. To solve the NP complete and NP hard problems heuristic approaches are used. This study proposes a hybrid optimization based on Particle Swarm Optimization (PSO) and Genetic Algorithm (GA) for scheduling in cloud environments.

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Hybrid Genetic Swarm Scheduling for Cloud Computing

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I. Introduction

Cloud computing attracts increasing applications to run in remote datacenters. Many complex applications need parallel processing capabilities some of which show a decrease in CPU resources use. Whenever there is a parallelism increase, when jobs are not scheduled correctly, it reduces computer performance. Scheduling allocates tasks to available resources based on tasks' qualities and need [1, 2]. The goal of scheduling is increased resource use without affecting cloud provided services.

Scheduling efficiency mechanism in cloud computing depends on how efficiently it manages the processes and increases server performance as well as resources. Scheduling problems involve jobs that should be scheduled on machines subject to constraints to optimize a given objective function [3]. The goal is computing a schedule that specifies when and on which machine a job is to be executed. The scheduler in online scheduling receives jobs that arrive over time, and schedules them without any knowledge of the future.

Cloud scheduling process is divided into 3 stages namely:

a) Resource discovering and filtering- Datacenter Broker discovers resources in a network system collecting status information on resources.

b) Resource selection - Target resource is selected based on task requirements and resource. The deciding stage.

c) Task allocation -Task is allocated to selected resource.

In Cloud computing, Task Scheduling algorithms aim to minimize tasks make span with minimum resources efficiently. Cloud computing, uses low-power hosts to achieve high usability. Cloud computing is a class of systems and applications that use distributed resources to perform a decentralized function [4].

Clouds computing, uses computing resources (service nodes) in networks to, ensure complicated tasks execution needing large-scale computation. Thus, node selection to execute a task in cloud computing is to be considered. Scheduling algorithms utilize better executing efficiency and maintain system load balancing. The cloud's efficiency depends on algorithms used for task scheduling.

The job scheduling algorithm's advantage is achieving high performance computing and best system throughput [5]. Traditional job scheduling algorithms cannot provide scheduling in cloud environments. According to simple classification, job scheduling algorithms in cloud computing are categorized into 2 groups; Batch mode heuristic scheduling algorithms (BMHA) and online mode heuristic algorithms.

Task scheduling algorithm maps jobs submitted to cloud environment to available resources so that in total response time, make span is minimized. A Max-Min algorithm feature is selecting the largest job and executing it on the fastest resource. The algorithm's drawback is its delaying execution of smaller jobs and indefinitely postponing smaller jobs execution because of the cloud's dynamic nature. The solution to this is improved Max-Min, which works well for a given set of jobs but, the dynamic cloud environment where jobs are submitted any time results in performance degradation.

Min-Min algorithm first finds minimum tasks execution time and then chooses one with least execution time. The algorithm assigns the task to a resource with minimum completion time. The same is repeated by Min-Min, till all tasks are scheduled [6, 7]. The algorithm's limitation is that it chooses smaller tasks first using up resources with high computational power.

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Conventional scheduling is infeasible in a cloud environment due to its dynamic, distributed, and sharable properties. Tasks resource allocation is to meet performance targets. Many jobs need resources while operating simultaneously [8]. It is important to balance jobs on appropriate resources for optimal performance and cloud's efficient working. So, varied task parameters are considered for scheduling. Available resources should be effectively used without affecting service parameters.

Cloud environment system scheduling is NP-complete. As users increase, tasks to be scheduled also increase proportionately. So, better algorithms to schedule tasks on such systems are required. Scheduling algorithms are service-oriented and vary in environments. To solve NP complete and NP hard problems, heuristic approaches are used. Heuristic techniques used are local heuristics, meta-heuristics and hyper-heuristics. Hyper-heuristics operate at a higher abstraction levels. Meta-heuristic techniques are expensive techniques needing knowledge in problem domain and heuristic technique.

Evolutionary algorithms are based on species origin. Examples are Particle Swarm Optimization (PSO) and Genetic algorithm (GA). PSO is a parallel evolutionary computation technique and a heuristic search method inspired by biological populations swarming behavior [9]. Using PSO ensures a good performance. GA is a search heuristic that mimics natural evolution. It is routinely used to generate useful solutions for optimization and search problems. GAs belongs to a larger class of evolutionary algorithms, generating solutions to optimization problems with techniques from natural evolution like inheritance, selection, mutation, and crossover [10].

PSO algorithm has many advantages like easy realization, high flexibility, strong robustness, and scalability due to which it solves many combinational problems. But, its disadvantages are low convergence rate when solving large scale optimization problems and easily sinking into local optima due its randomicity [11]. PSO is good in an initial phase but when going through iterations convergence rate becomes low and particles lose variety.

There is need for an algorithm to offset these issues and so this study proposed a hybrid algorithm where PSO combines with GA i.e. GAPSO algorithm ensuring better results due to the properties of both. The remaining sections of this paper are organized as follows: Section 2 reviews related work, Section 3 explains the methodology. Section 4 discusses experimental results and Section 5 concludes the work.

II. Related Works

A hybrid task scheduling algorithm based on combining plus points of bio-inspired algorithms like Ant Colony Optimization (ACO) and Artificial Bee Algorithm (ABC) was proposed by Madivi and Kamath [12]. The strong points of both algorithms are incorporated to optimize task scheduling in a cloud algorithm. It is observed that the new algorithm ensured an improvement of about 19% compared to default FCFS scheduling strategy, 11% better than ABC algorithm and was 9% better than conventional ACO based task scheduling.

A Hybrid algorithm combining advantages of ACO and Cuckoo search was proposed by Raju et al., [13]. The makespan is lowered by the hybrid algorithm, as jobs were executed in a specified time interval by required resources allocation using the Hybrid algorithm. Results showed that Hybrid algorithm performed well when compared to ACO algorithm regarding performance of algorithm and make span.

The advantage of Multi-Agent Genetic Algorithm (MAGA) a hybrid of GA, whose performance is superior to traditional GA was proved by Zhu et al., [14]. MAGA solved load balancing in cloud computing by designing a load balancing model based on virtualization resource management. Experiment results comparing MAGA with Minimum strategy proved that MAGA achieved better load balancing performance.

The performance of Hadoop schedulers including FIFO and Fair sharing was analyzed by Rasooli and Down [15] comparing them with a Classification and Optimization based Scheduler for Heterogeneous Hadoop (COSHH) scheduler, developed by the authors. A hybrid solution was introduced, based on insights which selected appropriate scheduling algorithms for scalable and heterogeneous Hadoop systems regarding number of incoming jobs and available resources.

A new parallel hybrid evolutionary algorithm to solve issues of virtual machines subletting in cloud systems was presented by Iturriaga et al., [16]. It deals with allocation of a set of Virtual Machine (VM) requests from customers to available pre-booked resources from a cloud broker, to maximize broker profit. The new parallel algorithm used a distributed subpopulations model, and a Simulated Annealing operator. Evaluation analyzed profit and makespan results of the new methods over a set of problem instances accounting for realistic workloads and scenarios with real data from cloud providers. A comparison with greedy heuristics revealed that the new method computed solutions with up to 133.8% improvement in profit values, while ensuring accurate make span results.

A hybrid batch job scheduling method for grid environment combining GA and PSO techniques to reduce makespan and flow time was proposed by Dehghani Zahedani and Dastghaibyfard [17]. Results showed a reduced make span in 7 of 12 instances of Braun workload compared to Min-Min, Max-Min, and discrete PSO algorithms.

A hybrid scheduling method that computed 5 different schedules, based on a combination of two resource selection rules with 4 job selection rules using the best of the five was proposed by Ashraf and Erlebach [18]. Simulation of workflow scheduling in an advance reservation environment conducted with GridSim revealed that the new hybrid scheduling method achieved makespan improvement of up to 25.5% on benchmark workflows, compared to earlier methods.

A hybrid algorithm, ant colony system and GA to solve job scheduling issues was proposed by Alobaedy and Ku-Mahamud [19]. The high level hybridization algorithm ensured the identity of the algorithm performing scheduling tasks. The new study focused on static grid computing environment and metrics for optimization are makespan and flow time. Results showed that the new algorithm outperformed other stand-alone algorithms like ant system, GA and ant colony system for makespan. But for flow time, ant system and GA performed better.

A new updating mechanism for discrete PSO that directly used discrete solutions from personal and global best particles was proposed by Nguyen and Zhang [20]. A new local search heuristic was proposed to refine solutions found by PSO. Results showed that hybrid PSO is more effective than current PSO methods in literature when tested on 2 benchmark datasets. The efficient hybrid method suited handling large-scale problem instances.

Map Reduce HPSO-GA based on Map Reduce parallel programming model presented by Sadasivam and Selvaraj [21] yielded better results than normal PSO providing better load balancing and resource use in grid environment. It identified the node to which a task is assigned in a Hadoop cluster. So, the new approach could be used in Hadoop resource management system with Hadoop and system parameters to schedule jobs in a Hadoop cluster.

A hybrid job scheduling approach, which considered system load balancing and reduced total execution time and execution cost was presented by Javanmardi et al., [22]. The proposed work's goal was assigning jobs to resources considering VM MIPS and jobs length. The new algorithm assigned jobs to resources considering job length and resource capacity. Performance was evaluated with famed cloud scheduling models. Results showed the proposed approach's efficiency regarding execution time, execution cost and average degree of imbalance.

III. Methodology

In this work, a hybrid algorithm for cloud scheduling is proposed. It is based on PSO and GA. In the hybrid algorithm PSO combines with GA i.e. GAPSO algorithm ensuring better results.

a) Genetic Algorithm (GA)

GA is a meta-heuristic technique solving optimization problems by imitating natural selection; i.e., the adaptation to an environment performed by living beings [23]. GA is an appealing approach to solve a complex problem. GA determines not one solution but a whole 'population' of 'individuals,' which are candidate solutions to a problem. Each individual's distinctive features are coded into a 'chromosome' which is a string of genes, whose values are chosen from a set of symbols.

GAs are stochastic search methods managing a population of simultaneous search positions. A conventional GA has 3 essential elements:

- a coding of the optimization problem
- a mutation operator
- a set of information-exchange operators

GAs evaluate target function to be optimized at randomly selected points of a definition domain. Considering this information, a new set of points (a new population) is generated. Gradually the population approaches a function's local maxima and minima. The GA's pseudo code is given below [24].

1. Choose initial population(Random)
2. Repeat (until terminated)

2.1 Evaluate each individual Fitness

2.2 Prune population (Typically all; If not then the worst)

2.3 Select pairs to mate from best-ranked individuals

2.4 Replenish population (Selected pairs)

2.4.1 Apply Crossover operator

2.4.2 Apply mutation operator

3. Check for termination criteria

3.1 Loop if not terminating(Repeat from step 2)

b) Particle Swarm Optimization (PSO)

PSO, like other evolutionary computation techniques is a population based search algorithm initialized with a population of random solutions, called particles. Unlike other evolutionary computation techniques, a PSO particle is associated with velocity. Particles fly through search space with velocities, dynamically adjusted according to their and swarm's historical behaviors. So, particles fly towards better and better solutions in a search process. PSO algorithm is simple in concept, easy to implement, and efficient computationally. The PSO algorithm's updating rules are listed as [25].

$$V_i = W.V_i + C_1.rand_1(X_p - X_i) + C_2.rand_2(Xg - X_i)\ X_i = X_i + V_i$$

The PSO algorithm consists of just three steps, which are repeated until some stopping condition is met [26]:

1. Evaluate the fitness of each particle
2. Update individual and global best fitness and positions
3. Update velocity and position of each particle

The first two steps are fairly trivial. Fitness evaluation is by supplying a candidate solution to an objective function. Individual and global best fitness and positions are updated by comparing newly evaluated fitness against earlier individual and global best fitness, and replacing best fitness and positions as needed. The PSO algorithm is summarized as follows [27]:

1. Initialize the swarm X_i, the position of particles are randomly initialized within the hypercube of feasible space.
2. Evaluate the performance F of each particle, using its current position $X_i(t)$.
3. Compare the performance of each individual to its best performance so far: if $F(X_i(t)) < F(P_{ibest})$:
   $F(P_{ibest}) = F(X_i(t))$
   $P_{ibest} = X_i(t)$
4. Compare the performance of each particle to theglobal best particle: if $F(X_i(t)) < F(P_{gbest})$:
   $F(P_{gbest}) = F(X_i(t))$
   $P_{gbest} = X_i(t)$
5. Change the velocity of the particle.
6. Move each particle to a new position.
7. Go to step 2, and repeat until convergence.

c) Hybrid Genetic Algorithm Particle Swarm Optimization (GAPSO)

GAs were applied successfully to varied problems. But, using them for large-scale optimization is expensive due to its requirement of many function evaluations for convergence, leading to high cost for function evaluations computation [28]. Considering the PSO's efficiency and GA and PSO's compensatory property combining searching abilities of both in one algorithm seems logical. Both GA and PSO share common elements [29]:

1. Both initialize a population similarly.
2. Both use an evaluation function to determine a potential solution's fitness.
3. Both are generational, repeating same processes for a predetermined time.

A hybrid algorithm has operator like enhancement, selection, crossover, and mutation.

Enhancement: In every generation, after fitness values of population individuals are calculated, the top-half best performers are marked and regarded as elite. Instead of reproducing the elite directly to next generation as elite GAs do, they are first enhanced.

Here, a dynamic decrease of ω value was suggested based on a fraction multiplier (kw). When no improvement was made for a predefined number of consecutive design iterations:

$$\omega^{t+1} = k_w \omega^t$$

It should be noted that elite in a generation can be from both groups of an earlier generation, i.e., enhanced elite or produced offspring. If elite i is an offspring produced by parents of a previous generation, then v_i^t is set to zero, and p_i^t is set to x_i^t , i.e., the newly generated individual itself. Otherwise, p_i^t records best solution of individual i evolved till then.

Selection: In GAPSO, GA operations are performed on the enhanced elite achieved by PSO. To select parents for crossover, a tournament selection scheme is used. Two enhanced elite are selected randomly, and their fitness values compared to select one with better fitness as a parent for placing it in a mating pool. This scheme is the selection operator in GA also.

Crossover: Parents are randomly selected from the mating pool in groups of two and two offspring are created through a crossover on parent solutions. This study uses a simulated binary crossover (SBX) [28]. SBX operator is suitable as the spread of children solutions around parent solutions is controlled using distribution index, ηc. With this operator, an arbitrary contiguous region can be searched, provided there is enough diversity among feasible parent solutions

Mutation: A final genetic operator, it creates new genetic material in the population to maintain the latter's diversity. Mutation operator used is a variable dependent random mutation where a solution is created near the parent solution with uniform probability distribution

$$x_i^{(1,t+1)} = x_i^{(1,t)} + (r_i - 0.5)\Delta_i$$

r_i is a random number in [0, 1]. Δ_i is user defined maximum perturbation allowed in ith decision variable (x_i). It should be checked if the above calculation takes $x_i^{(1,t+1)}$ outside a specified lower and upper limits.

IV. Experimental Results

To verify the proposed algorithm Cloudsim, a simulation software provided by Gridbus project was used. The proposed algorithm is integrated in the cloudsim layer. The simulator models the datacenter components which are designed to handle the service requests. These requests are the tasks which need to be allocated to VMs for processing. The VM is allocated a

share of processing power by the Datacenter. Each VM has a pre configured processing capability based on memory, storage and Millions of Instructions it can execute per second. In this work four VMs from two data centers are used. The available Band Width of 128Kbps is dynamically varied. Similarly the memory is also dynamically varied from 256 Mb to 1.5 Gb. In this work, number of tasks were varied from 200 to 1000 in increments of 200 for estimating average schedule length and ratio of successful execution.The results are shown in table 1.

Table 1 : Average Schedule Length

Number of tasks	Max-Min scheduling	Minimum Execution time	Hybrid GAPSO
200	679	664	641
400	1364	1337	1290
600	2072	2048	1956
800	2746	2690	2592
1000	3438	3373	3253

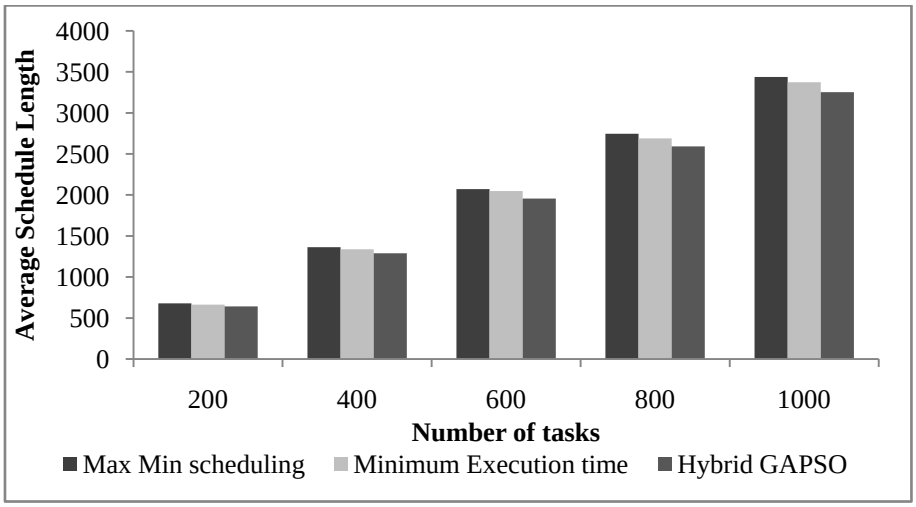

Figure 1 : Average Schedule Length

From table 1 and figure 1 it is observed that the proposed GAPSO performs better by reducing the schedule length when compared to Max-Min Scheduling and Minimum Execution time. The GAPSO reduced average schedule length by 5.76% than Max-Min Scheduling and by 4.6% than Minimum Execution Time with 600 numbers of tasks.

Table 2 : Ratio of successful execution

Number of tasks	Max Min scheduling	Minimum Execution time	Hybrid GAPSO
200	0.91	0.94	0.96
400	0.89	0.91	0.95
600	0.87	0.89	0.91
800	0.87	0.87	0.89
1000	0.85	0.86	0.88

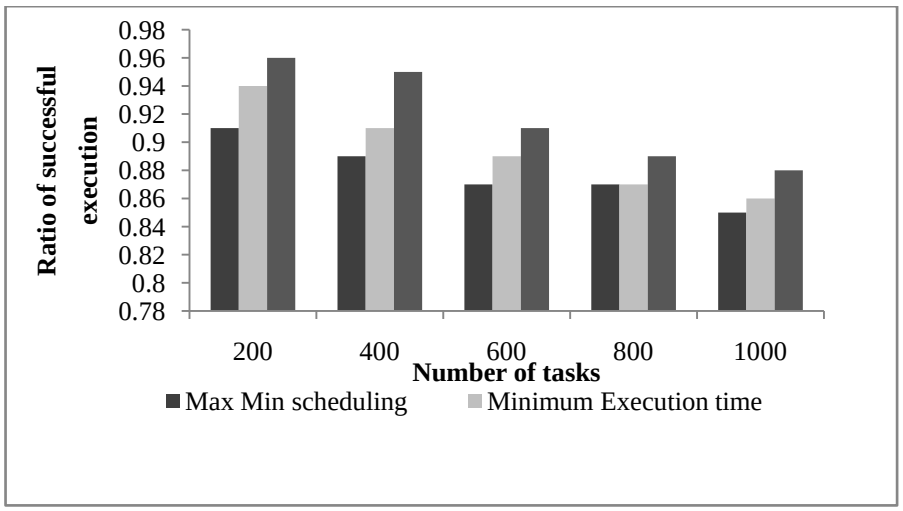

Figure 2 : Ratio of successful execution

From table 2 and figure 2 it is observed that the proposed GAPSO performs better by increasing the execution ratio when compared to Max-Min Scheduling and Minimum Execution time. The GAPSO improved Ratio of successful execution by 6.52% than Max-Min Scheduling and by 4.3% than Minimum Execution Time with 400 numbers of tasks.

V. Conclusion

Cloud computing is a provider of dynamic services using huge scalable and virtualized resources over the Internet. Due to its novelty, there is no standard task scheduling algorithm in a cloud environment. In this study, the GAPSO performs better when compared to Max-Min Scheduling and Minimum Execution time in case of schedule length and execution ratio. GAPSO reduced average schedule length by an average of 5.66% than Max-Min Scheduling and by an average of 3.83% than Minimum Execution Time. GAPSO improves execution ratio by an average of 4.45% than Max-Min Scheduling and by an average of 2.65% than Minimum Execution Time.

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Operational Analysis of Private Cloud using Eucalyptus

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Abstract- Distributed environment is an invoking idea in computer field, since it gave permissions that the assets to be purveyed according to the client needs [1]. The paper addresses the system of arrangement of a private cloud in improving the practical furthest reaches of cloud processing at compelled states of arrangement. It is the review of all previous research based on Private Cloud using Eucalyptus. It gives benefits on virtual machines where the client impart assets, programming and different gadgets on interest. Cloud administrations are backed with proprietor and Open Source Systems (OSS). As Restrictive items remain exceptionally costly, clients unable to permitted test on their item and protection is a significant affair in it.Cloud registering frameworks in a broad sense give access to expansive pools of information and computational assets through a mixed bag of interfaces. These sorts of frameworks offer another programming focus for versatile application engineers and have picked up ubiquity over the recent years. Then again, most distributed computing frameworks in operation today are exclusive, depend upon base that is undetectable to the research group, or are not unequivocally intended to be instrumented and adjusted by frameworks specialists.

Keywords: cloud computing, distributed computing, eucalyptus cloud, private cloud, virtualization, hypervisor.

GJCST-B Classification : D.4.8

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Anurag Pandey [α] & Ms. AlpikaTripathi [σ]

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Keywords: cloud computing, distributed computing, eucalyptus cloud, private cloud, virtualization, hypervisor.

I. Introduction

Distributed computing or cloud computing which give authority for all services on-interest framework access to a confer pool of arranged assets which can directly provide action and relinquished with irrelevant organization seek or organization supplier affiliation. Cloud computing suppliers communicate the applications by means of the web, which are gotten to from a Web program, while the business programming and all confidential data are put away on servers at a remote area. Distributed computing is a model which enable access to configurable assets which directly or immediately provide and allowed organization supplier cooperation.

II. Types of Cloud Services

a) PaaS

(Platform as a service) capacities at a lower level than SaaS, regularly giving a stage on which can be produced and conveyed [2]. PaaS suppliers theoretical a great part of the work of managing servers and give customers a situation in which the working framework and server programming, and in addition the fundamental server equipment and system foundation are dealt with, leaving clients allowed to concentrate on the business side of versatility, and the application advancement of their item or administration.

b) SaaS

(Software as s service) is a cloud display that conveys on-interest applications that are facilitated and oversaw by the administration supplier and ordinarily paid for on a membership premise[3]. SaaS arrangements offer various preferences over on-premises organizations, including negligible organization and upkeep, anyplace get to, and by and large enhanced correspondence and coordinated effort. Some cloud-based apparatuses will likewise turn out to be more financially savvy than their conventional, in-house partners.

c) IaaS

(Infrastructure as a service) is a cloud model which permits associations to outsource processing gear and assets, for example, servers, stockpiling, organizing and in addition administrations, for example, burden adjusting and substance conveyance systems[6,8]. The IaaS supplier claims and keeps up the gear while the association leases the particular administrations it needs, generally on a "pay as you go" premise.

d) HaaS

(Hardware as a services) It's an acquirement process like authorizing. As a rule, an oversaw administration supplier remotely screens and manages equipment on a customer's site on a membership premise[7].

Virtualization: Virtualization is a method, which permits to impart single physical occasion of an application or asset among numerous associations or occupants (clients).It plans to make a virtual type of a device or resource, for instance, a server, stockpiling contraption, framework or even a working system or organization where the structure secludes advantage provide one or more then one execution situations. It is essential as distributing hard drive is treated virtualization in light of

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the fact that you take one drive and remnant it to make two varied hard drives.

For cloud figuring, scheme full virtualization can accrual operational competence in light of the fact that it can reinforce PC tasks load and tweak the quantity of servers being used to match request, consequently subdue intensity and data modernization assets [4,8]. For Full virtualization simulating bundles like VMware Server & Virtual Box are used or apply. Para virtualization is a strategy for the hypervisor to offer interfaces to the visitor working framework that the visitor working framework can use, rather than the exemplary equipment interfaces. On the off chance that a visitor working framework can utilize para virtualized interfaces, they offer altogether speedier access for assets such as hard drives and systems [6,9].

Eucalyptus: Eucalyptus wasoriginated in 2008 may, founder of the main susceptible Private Cloud stage[10,12]. It gives an EC2 (Elastic Compute Cloud)-great appropriated figuring stage and S3 (Straightforward Storage Service)-great propagate compile stage. it is feasible comes under the GPL that helps in generate and supervising both private or public cloud.

III. Eucalyptus Components

a) KVM

It is produced by Red Hat Corporation to give a virtualization arrangement and administrations on the Linux working framework stage. KVM is outlined over the essential Linux OS kernel. KVM (Kernel-based Virtual Machine) is a virtualization base for the Linux portion that transforms it into a hypervisor.

b) Node Controller (NC)

It controls the methodology of cycles made at every hub in the system by the virtual machine right from the beginning to last end[12]. Every hub of its execution is under its association. It corresponds with the Operating framework, Cluster Control, and CPU.

c) Cloud Controller (CL)

It has a key vitality in private cloud, and places the passage purpose of the whole cloud system. Each Eucalyptus cloud associates with one CL, introduced in the server which is a front-end to the contend outline [13]. The module gives web administrations interface outer to the cloud, associates with Amazon's Web Services' interfaces. The CL is mindful for verifying clients in checking examples running in the cloud and settles on the choice of needs of administrations [8].

d) Cluster Controller (CC)

It deals with the hubs regarding grabbing. The starting and ended hubs are gotten to at the same time. The CC can be gotten to for both the hubs and the cloud front-end at the same time.

e) Data saving Partition (DSP)

At the time the undertaking is being run, the customers of the cloud have been made to be at general society system. The ability of the virtual machine to access at web has been effectively analyzed in the cloud environment[15]. The systems administration setup and relating results relies on upon the mode of the Eucalyptus cloud associate simultaneously [9,14]. Control and administration gimmicks are relegated to the cloud overseer through the four vital modes[23]. The organizing setup and relating results depends on the mode of the Eucalyptus cloud associating simultaneously [9,14]. Control and administration gimmicks are relegated to the cloud overseer through the four vital modes.

f) Walrus

It gives persevering limit capacities to every virtual machine show on Eucalyptus Cloud Environment. It is basically a tremendous stockpiling system where customers can exchange data and any sort of record using direct HTTP tradition [11,17].

IV. Background

The current frameworks is a literature survey defined prior in the abstract are all open mists that are sent on the web and are topographically found far away[16,17].These frameworks give straightforwardness to the clients that get to the administrations through the World Wide Web [15,18]. Though, the framework proposed in our task is a private cloud, which is sent on the intranet of our school. This cloud will empower the clients to get to assets and applications on the cloud, based on the frameworks of the school itself [15,19].

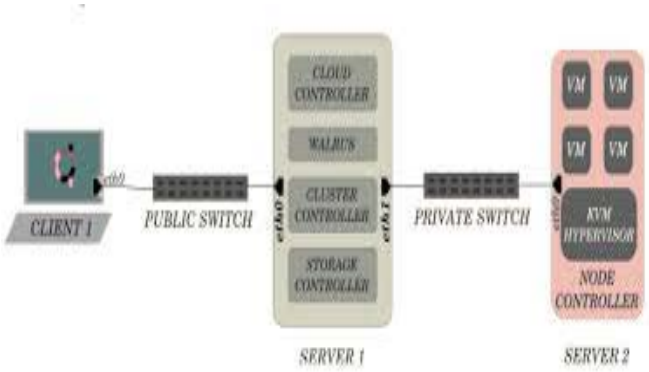


Figure 1 : Private Cloud Architecture [8, 11]

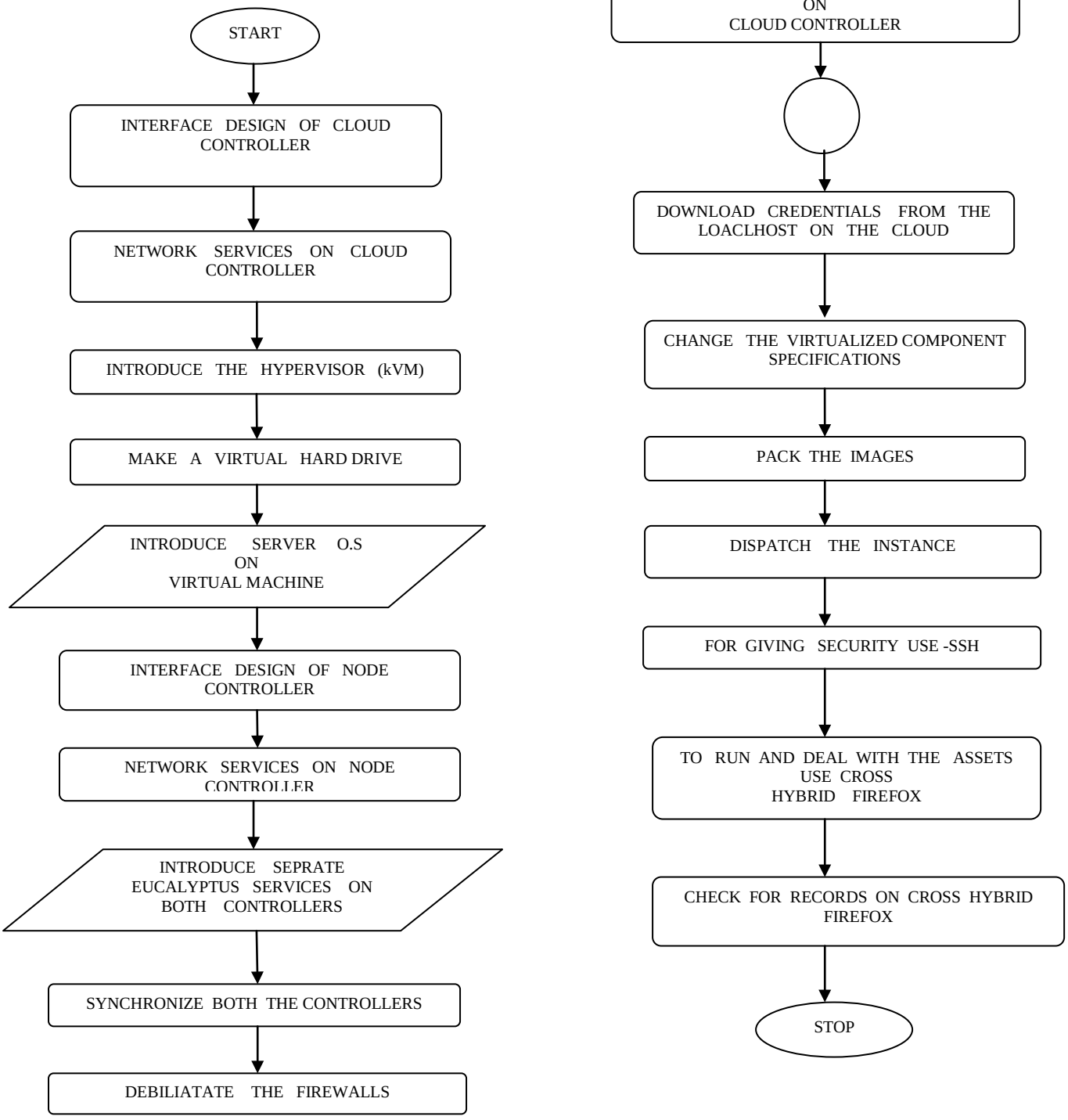
The volumes connected to the client occasion would be autonomous of the occasion which the client is running [22,10]. Every client has got his/her own volume (storage room) which can be connected to any of the occasions propelled by the client.

The framework will continually screen the heap on the Node Controllers and naturally perform suitable

assignments of Creation or Termination of Instances on the hub[21,22]. The framework begins the Node Controller if the heap surpasses a certain pointed out (Threshold is accepted at 80%) and close down a running Node Controller if the heap is underneath the pointed out limit for certain foreordained time of time [23].

V. Proposed Work

a) Proposed Algorithm



VI. Installation Proces

Server 1: Install Ubuntu undertaking cloud.

Established Cloud restrainer, Walrus carrying organization, Cluster restrainer and Storage restrainer.

Server 2: Install Ubuntu undertaking cloud.

Establishment Node control.

Exchange of Public SSH keys: On node controller setup an impermanent secret password.

Get Credentials: On the Cloud controller, introduce certifications which comprise of authentications and environment variable. Installation of images in Server. Finally Running Instances in cloud.

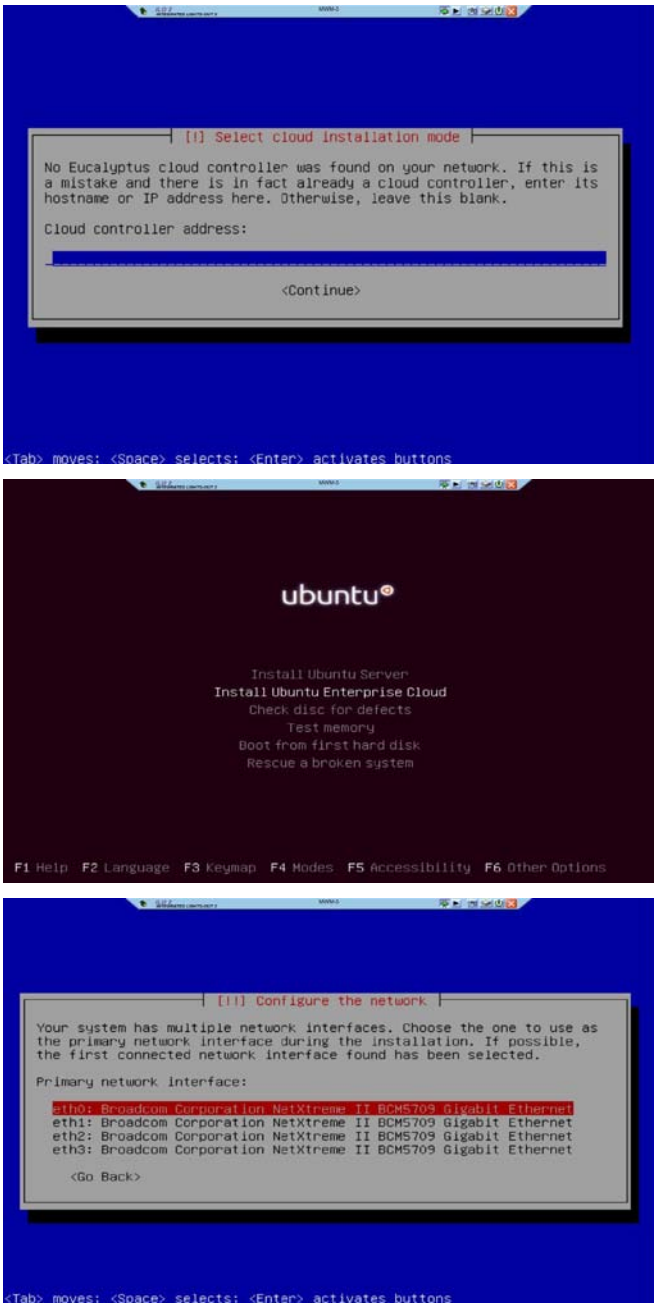


Figure 1 : Creating cloud controller

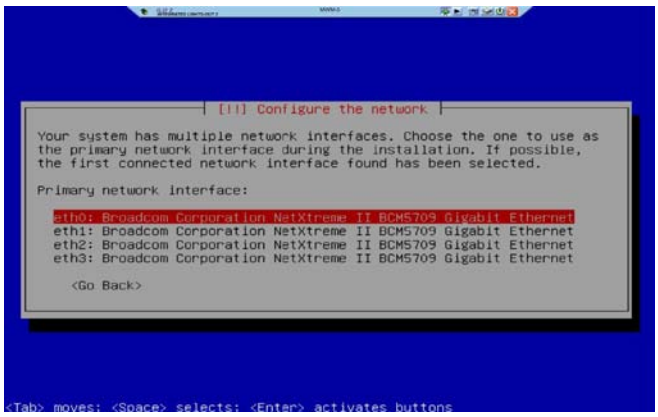


Figure 2 : Configure the network

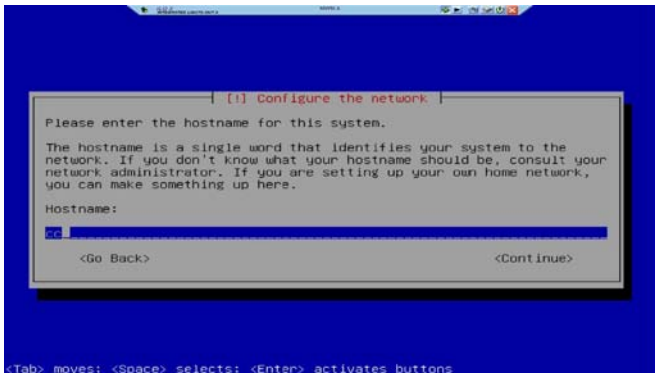


Figure 3 : Assigning host name

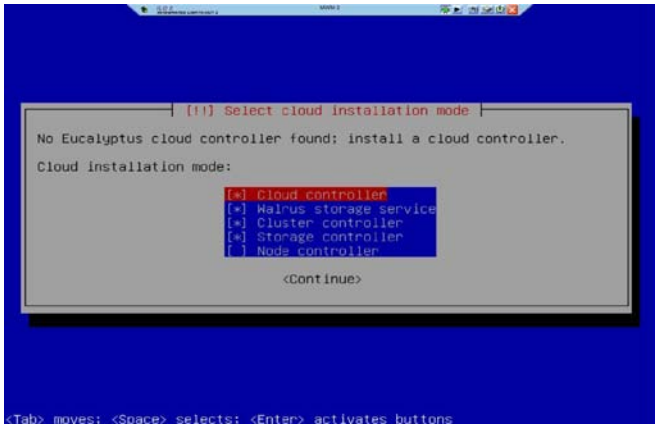


Figure 4 : Cloud Installation node

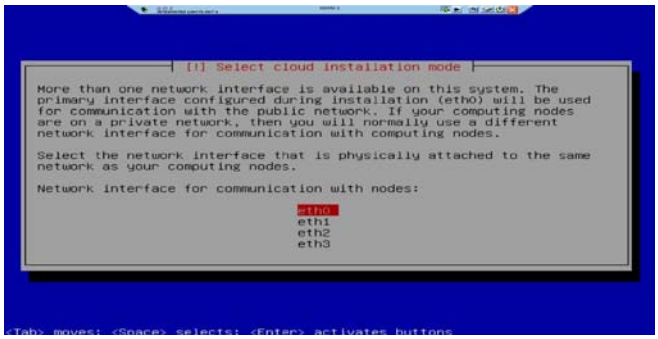


Figure 5 : choose Role of the server

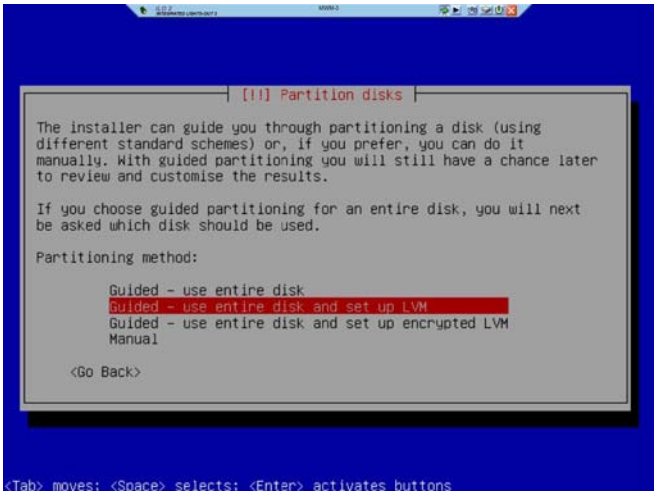


Figure 6 : We select eth0 to connect to the public network

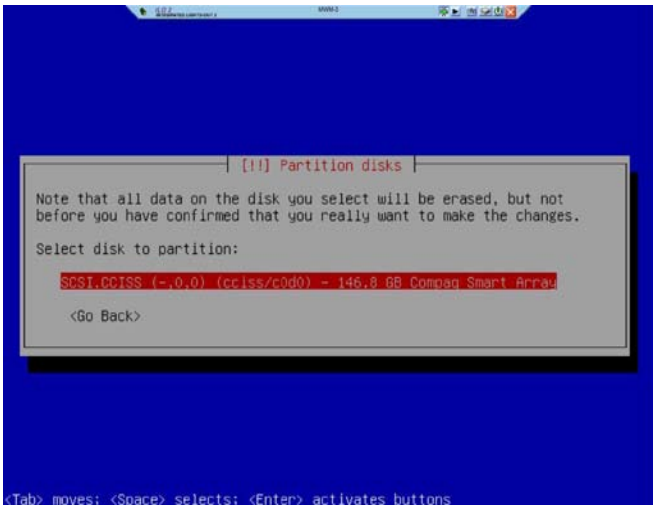


Figure 7 : Partition of Disks

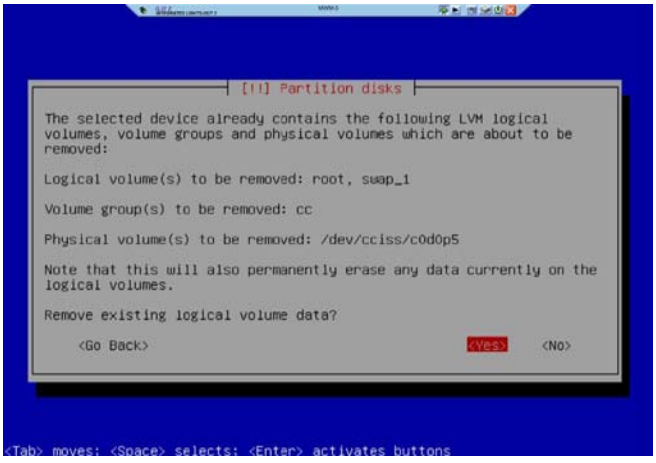


Figure 8 : Smart array bios

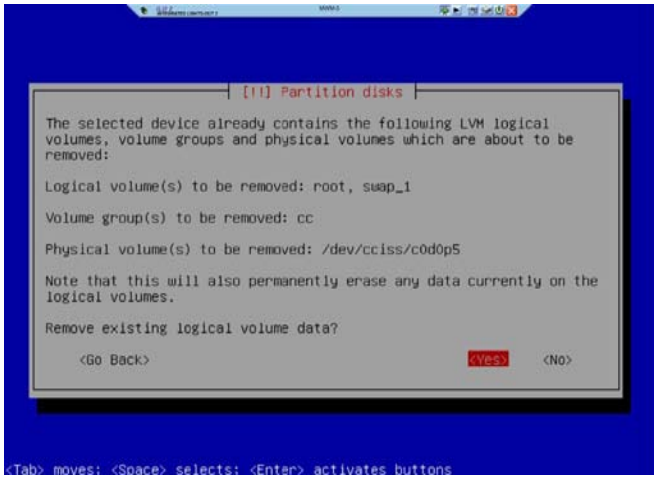


Figure 9 : If current data is observed we see this screen

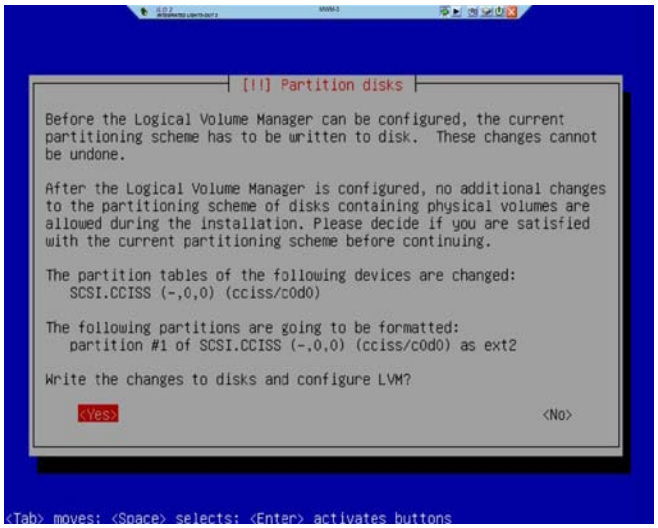


Figure 10 : configure Linux Volume Manager (LVM)

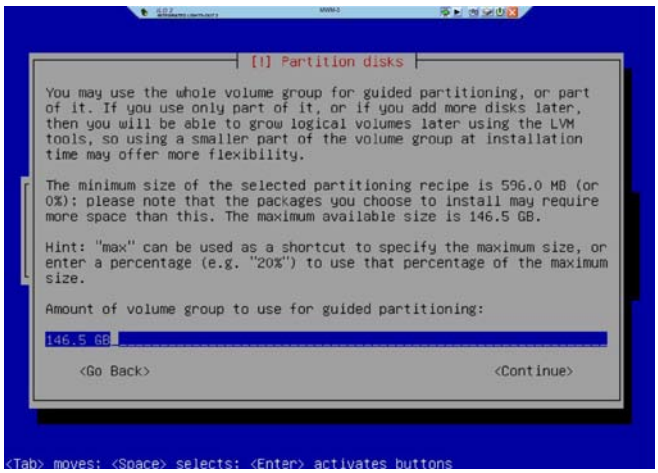


Figure 11 : Entire volume group for guided partitioning

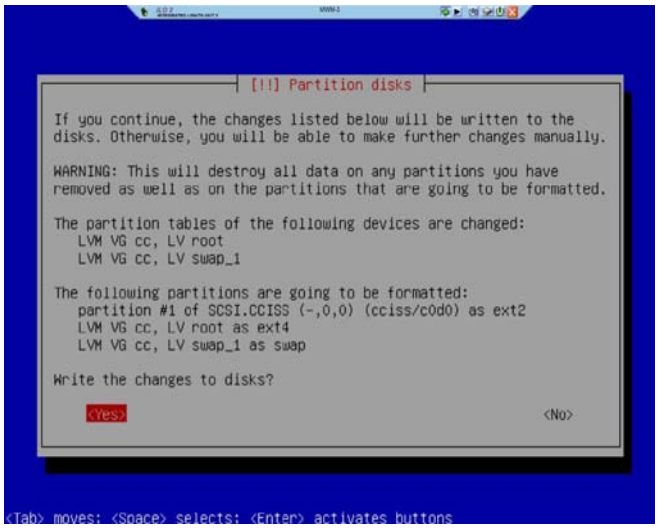


Figure 12 : New changes to disk

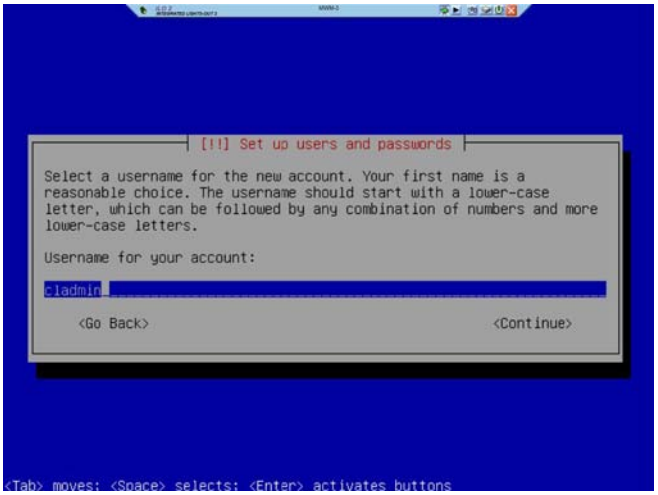


Figure 13 : Create a user account

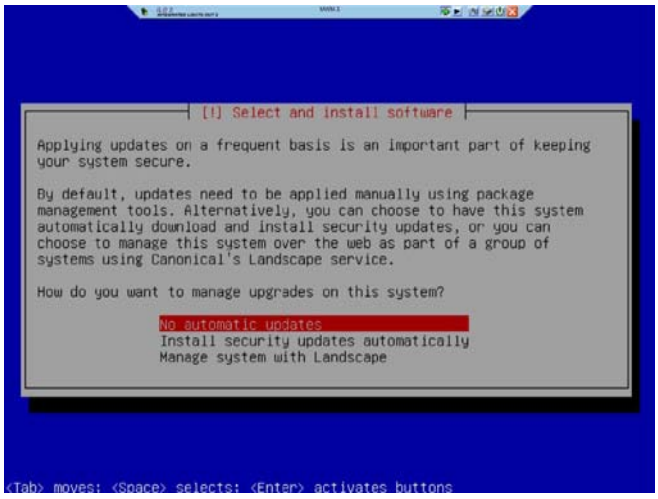


Figure 14 : Mange System Upgrade

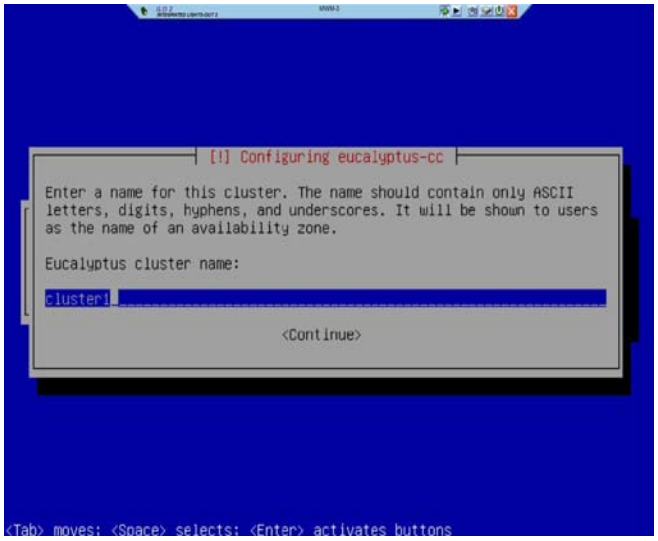


Figure 15 : Configure the cluster name

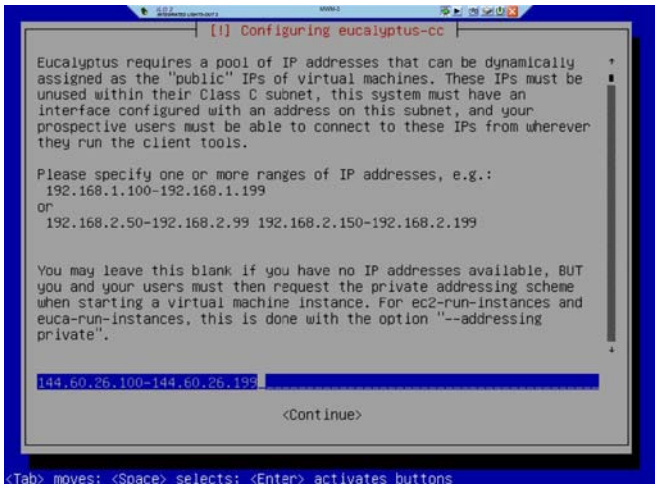


Figure 16 : Render pool of IP Addresses that automatically assigned to VMs

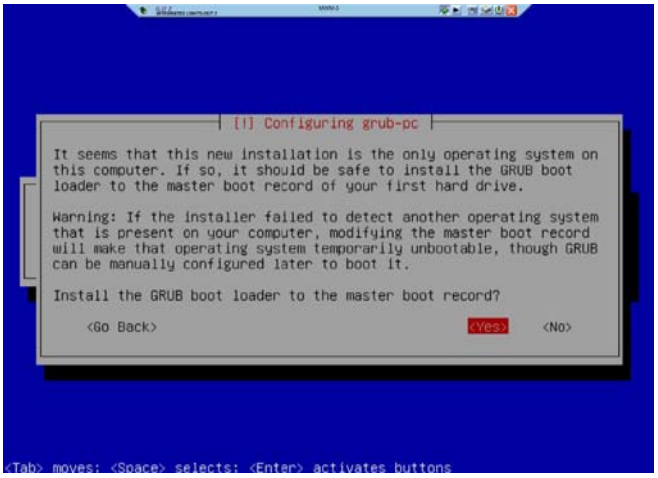


Figure 17 : Install GRUB (Grand Unified Boot loader)

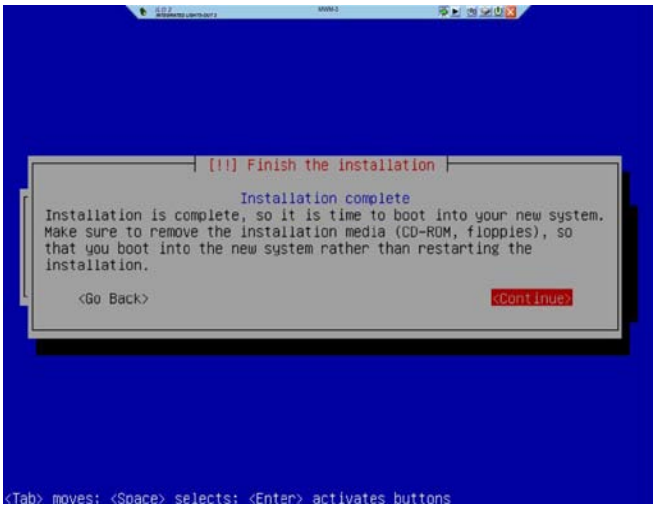


Figure 18 : Cloud Controller Installation is completed

Figure 19 : Creating Node controller

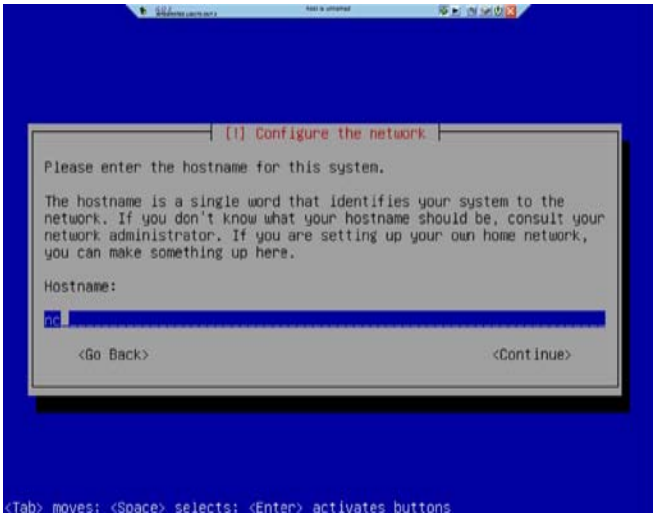


Figure 20 : Assigning host name

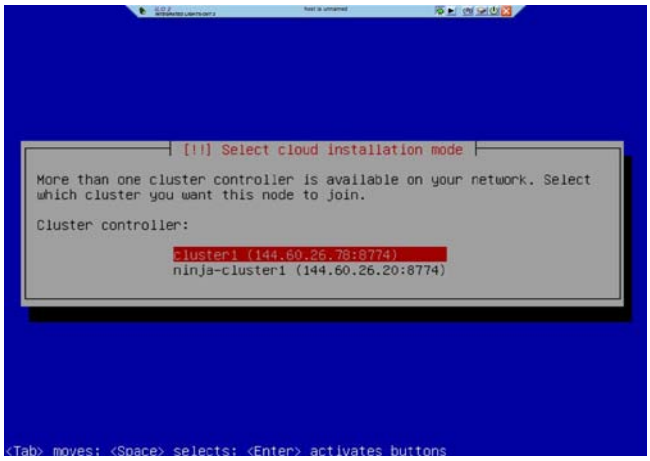


Figure 21 : Select Cloud Installation mode

Arranging Access for Eucalyptus users

Step 1: In this step we put on secret word (password) for the eucalyptus Account.

We get access to the node controller as user "cladmin" password "cloud20"

cladmin@nc:~$ sudopasswd eucalyptus

Type "cloud9" for the temporary password.

Step 2: In this step we get access to the Cloud Controller and copy the ssh open key for the eucalyptus client to the node controller:

cladmin@cc:~$ sudo -u eucalyptus ssh-copy-id -i ~eucalyptus/.ssh/id_rsa.pub eucalyptus@nc

Step 3: Presently, from our node controller we'll evacuate the temporary password :

cladmin@nc:~$ sudopasswd -d eucalyptus

Characteristics of Eucalyptus

EUCALYPTUS	
Service Type	IaaS
Scalability	Scalable
Interface	EC2, S3, EBS, Rest Interface
Hypervisor	VMWare (ESX/ESXi), KVM, Xen
Networking	Elastic IP, security groups, DHCP Server, and layer 2 VM isolation Four Modes : 1. Managed, 2. Managednov LAN, 3. Static, in (1)and (2) bridges are created automatically
Software Deployment	- Program is assured by the elements that can be arranged in different machines. - Compute nodes need to install Open Stack software
Dev Ops Deployment	Chef, Puppet
Storage (image TRANSFERENCE)	Walrus (http/s)
Authentication	LDAP, CHAP
Avg. Release Frequency	> 4 Months
License	Open-SOURCE COMMERCIAL

VII. Conclusion

Distributed computing is the accompanying gigantic wave in figuring. It has various benefits, for instance, better hardware organization, since all the PCs are the same and run the same gear. It too obliges better and less requesting organization of data security, since all the data is found on a central server, so heads can control who has and doesn't have permission to the records. There are some drawbacks also to cloud computing. Peripherals, for example, printers or scanners may have issues
managing the way that there is no hard commute appended to the physical, neighborhood machine.

On the off chance that there are machines a client utilizes at work that aren't their own for any reason, that oblige access to specific drivers or programs, it is still a battle to get this application to realize that it ought to be accessible to the client.

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Note :

"

- In future, if the board feels the necessity to change any board member, the same can be done with the consent of the chairperson along with anyone board member without our approval.
- In case, the chairperson needs to be replaced then consent of 2/3rd board members are required and they are also required to jointly pass the resolution copy of which should be sent to us. In such case, it will be compulsory to obtain our approval before replacement.
- In case of "Difference of Opinion [if any]" among the Board members, our decision will be final and binding to everyone.

"

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1. General,

2. Ethical Guidelines,

3. Submission of Manuscripts,

4. Manuscript's Category,

5. Structure and Format of Manuscript,

6. After Acceptance.

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· Shun use of extra pictures - include only those figures essential to presenting results

Title Page:

Choose a revealing title. It should be short. It should not have non-standard acronyms or abbreviations. It should not exceed two printed lines. It should include the name(s) and address (es) of all authors.

Abstract:

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript--must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing references at this point.

An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study, with the subsequent elements in any summary. Try to maintain the initial two items to no more than one ruling each.

- Reason of the study - theory, overall issue, purpose
- Fundamental goal
- To the point depiction of the research
- Consequences, including definite statistics - if the consequences are quantitative in nature, account quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As a outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an conceptual must be regular with what you reported in the manuscript
- Exact spelling, clearness of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else

Introduction:

The **Introduction** should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled the declared objectives.

Approach:

- Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done.
- Sort out your thoughts; manufacture one key point with every section. If you make the four points listed above, you will need a least of four paragraphs.

- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
- Shape the theory/purpose specifically - do not take a broad view.
- As always, give awareness to spelling, simplicity and correctness of sentences and phrases.

Procedures (Methods and Materials):

This part is supposed to be the easiest to carve if you have good skills. A sound written Procedures segment allows a capable scientist to replacement your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt for the least amount of information that would permit another capable scientist to spare your outcome but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section. When a technique is used that has been well described in another object, mention the specific item describing a way but draw the basic principle while stating the situation. The purpose is to text all particular resources and broad procedures, so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step by step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

Methods:

- Report the method (not particulars of each process that engaged the same methodology)
- Describe the method entirely
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures
- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

What to keep away from

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.

Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

Discussion:

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- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."
- Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.

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Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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