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An Analytical Study on Improvement of Cloud Provider Optimizations of Cost-Effectiveness and Scalability for multiple users Mechanism

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ABSTRACT : In this paper, We design a service mechanism for profit optimizations of each a cloud supplier and its multiple users. We consider, matter from a game meta physical perspective and characterize the link between the cloud supplier and its multiple users as a Stackelberg game, within which the ways of all users are subject to the cloud supplier. The cloud supplier tries to select and provision acceptable servers and put together a correct request allocation strategy to cut back energy price whereas satisfying its cloud users at an equivalent time. We approximate its servers choice area by adding a dominant parameter associate in unsigned put together an optimal request allocation strategy. For every user, we tend to style a utility operate which mixes cyberspace profit with time potency and try to maximize its price beneath the strategy of the cloud supplier. We tend to formulating the competitions among all users as a generalized nash equilibrium drawback. To solve the matter by using variational difference theory and prove that there exists a generalized equilibrium resolution set. Finally, We tend to propose associate in unsigned varying rule, that characterizes the whole method of our planned service mechanism. Conducting some numerical calculations to verify our theoretical analysis. The experimental results show that the profit, each of a cloud supplier and its multiple users by configuring correct strategies.

KEYWORDS : Service Provider, Cloud Computing, Dynamic Voltage Frequency Scaling (DVFS).

I. INTRODUCTION

Cloud computing is the use of computing resources (hardware and software) that are delivered as a service over a network (typically the Internet). The name comes from the common use of a cloud-shaped symbol as an abstraction for the complex infrastructure it contains in system diagrams. Cloud computing entrusts remote services with a user's data,



software and computation. Cloud computing consists of hardware and software resources made available on the Internet as managed third-party services [5]. These services typically provide access to advanced software applications and high-end networks of server computers. The goal of cloud computing is to apply traditional supercomputing, or high-performance computing power, normally used by military and research facilities, to perform tens of trillions of computations per second, in consumer-oriented applications such as financial portfolios, to deliver personalized information, to provide data storage or to power large, immersive computer games [4].

The cloud computing uses networks of large groups of servers typically running low-cost consumer PC technology with specialized connections to spread data-processing chores across them. This shared IT infrastructure contains large pools of systems that are linked together. Often, virtualization techniques are used to maximize the power of cloud computing [3].

Characteristics and Services Models :

The salient characteristics of cloud computing based on the definitions provided by the National Institute of Standards and Terminology (NIST) are outlined below:

- **On-Demand self-service** : A consumer can unilaterally provision computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service's provider[91].
- **Broad Network access** : Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms (e.g., Mobile phones, laptops, and PDAs).
- **Resource pooling** : The provider's computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand. There is a sense of location-independence in that the customer generally has no control or knowledge over the exact location of the provided resources but may be able to specify location at a higher level of abstraction (e.g., country, state, or data center). Examples of resources include storage, processing, memory, network bandwidth, and virtual machines [34].
- **Rapid Elasticity** : Capabilities can be rapidly and elastically provisioned, in some cases automatically, to quickly scale out and rapidly released to quickly scale in. To the consumer, the capabilities available for provisioning often appear to be unlimited and can be purchased in any quantity at any time [27].
- **Measured service** : Cloud systems automatically control and optimize resource use by leveraging a metering capability at some level of abstraction appropriate to the type of service (e.g., storage, processing, bandwidth, and active user accounts). Resource usage can be managed, controlled, and reported providing transparency for both the provider and consumer of the utilized service [16].

Advantages :

1. **Price** : Pay for only the resources used.
2. **Security** : Cloud instances are isolated in the network from other instances for improved security.
3. **Performance** : Instances can be added instantly for improved performance. Clients have access to the total resources of the Cloud's core hardware.
4. **Scalability** : Auto-deploy cloud instances when needed.
5. **Uptime** : Uses multiple servers for maximum redundancies. In case of server failure, instances can be automatically created on another server.

II. RELATED WORKS

Hatman: Intra-Cloud Trust Management for Hadoop, S. M. Khan and K. W. Hamlen - Data and computation integrity and security are major concerns for users of cloud computing facilities. Many production-level clouds optimistically assume that all cloud nodes are equally trustworthy when dispatching jobs; jobs are dispatched based on node load, not reputation. This increases their vulnerability to attack, since compromising even one node suffices to corrupt the integrity of many distributed computations. This paper presents and evaluates Hatman: the first full-scale, data-centric, reputation-based trust management system for Hadoop clouds. Hatman dynamically assesses node integrity by comparing job replica outputs for consistency. This yields agreement feedback for a trust manager based on Eigen Trust. Low overhead and high scalability is achieved by formulating both consistency-checking and trust management as secure cloud computations; thus, the cloud's distributed computing power is leveraged to strengthen its security. Experiments demonstrate that with feedback from only 100 jobs, Hatman attains over 91% accuracy when 27% of the Hadoop cloud is malicious [1].

Privacy, Security and Trust in Cloud Computing, S. Pearson - Cloud computing refers to the underlying infrastructure for an emerging model of service provision that has the advantage of reducing cost by sharing computing and storage resources, combined with an on-demand provisioning mechanism relying on a pay-per-use business model. These new features have a direct impact on information technology (IT) budgeting but also affect traditional security, trust and privacy mechanisms. The advantages of cloud computing its ability to scale rapidly, store data remotely and share services in a dynamic environment can become disadvantages in maintaining a level of assurance sufficient to sustain confidence in potential customers [2].

Trusted Cloud Computing with Secure Resources and Data Coloring, K. Hwang and D. Li - Trust and security have prevented businesses from fully accepting cloud platforms. To protect clouds, providers must first secure virtualized data center resources, uphold user privacy, and preserve data integrity. The authors suggest using a trust-overlay network over multiple data centers to implement a reputation system for establishing trust between service providers and data owners. Data coloring and software watermarking techniques protect shared data objects and massively distributed software modules. These techniques safeguard multi-way authentications, enable single sign-on in the cloud, and tighten access control for sensitive data in both public and private clouds [5].

Towards a Trust Management System for Cloud Computing, S. Habib, S. Ries, and M. Muhlhauser - Cloud computing provides cost-efficient opportunities for enterprises by offering a variety of dynamic, scalable, and shared services. Usually, cloud providers provide assurances by specifying technical and functional descriptions in Service Level Agreements (SLAs) for the services they offer. The descriptions in SLAs are not consistent among the cloud providers even though they offer services with similar functionality. Therefore, customers are not sure whether they can identify a trustworthy cloud provider only based on its SLA. To support the customers in reliably identifying trustworthy cloud providers, we propose a multi-faceted Trust Management (TM) system architecture for a cloud computing marketplace. This system provides means to identify the trustworthy cloud providers in terms of different attributes (e.g., security, performance, compliance) assessed by multiple sources and roots of trust information [81].

Compliant Cloud Computing (C3) : Architecture and Language Support for User-Driven Compliance Management in Clouds, I. Brandic, S. Dustdar, T. Anstett, D. Schumm, F. Leymann, and R. Konrad - Cloud computing represents a promising computing paradigm, where computational power is provided similar to utilities like water, electricity or gas. While most of the Cloud providers can guarantee some measurable non-functional performance metrics e.g., service availability or throughput, there is lack of adequate mechanisms for guaranteeing certifiable and auditable security, trust, and privacy of the applications and the data they process [7]. This lack represents an obstacle for moving most business relevant applications into the Cloud. In this paper we devise a novel approach for compliance management in Clouds, which we termed Compliant Cloud Computing (C3). On one hand, we propose novel languages for specifying compliance requirements concerning security, privacy, and trust by leveraging domain specific languages and compliance level agreements [8]. On the other hand, we propose the C3 middleware responsible for the deployment of certifiable and auditable applications, for provider selection in compliance with the user requirements, and for enactment and enforcement of compliance level agreements. We underpin our approach with a use case discussing various techniques necessary for achieving security, privacy, and trust in Clouds as for example data fragmentation among different protection domains or among different geographical regions [7].



III. EXISTING SYSTEM

Existing framework proposes an hardly any previous works investigate multiple user's profit optimizations, let alone optimizing the profits of a cloud provider and its users at the same time. Meietal proposed an energy-aware scheduling algorithm for sporadic tasks. The authors try to reduce energy consumption by using Dynamic Voltage Frequency Scaling (DVFS) technique. In existing system, based on DVFS technique and the concept of slack sharing among processors, the authors also proposed two novel energy-aware scheduling algorithms [26].

DISADVANTAGES OF EXISTING SYSTEM :

- Since multiple users will try to access the data application performance depends upon the user's data requests.
- The existing system unable to avoid the server energy cost.

IV. PROPOSED SYSTEM

In this paper, we try to design a new service mechanism for profit optimizations of both a cloud provider and its multiple users. We consider the problem from a game theoretic perspective and characterize the relationship between the cloud provider and its users as a Stackelberg game, in which the strategies of all users are subject to that of the cloud provider. In our mechanism, the cloud provider tries to select appropriate servers and configure a proper request allocation strategy to reduce energy cost while satisfying its users at the same time [24].

ADVANTAGES OF PROPOSED SYSTEM :

- Cost effectiveness will be provided.
- Application performance will be improved.
- In this work, we first try to optimize multiple users. Since multiple cloud users compete for using the resources of a cloud provider, and the utility of each user is affected by the decisions (service request strategies) of other users, it is natural to analyze the behaviors of such systems as strategic games [36].
- We characterize the relationship between the cloud provider and its users as a Stackelberg game, and try to optimize the profits of both a cloud provider and its users at the same time.
- We formulate the competitions among all users as a Generalized Nash Equilibrium Problem (GNEP), and prove that there exists a generalized Nash equilibrium solution set for the formulated GNEP [83].

V. PROCEDURE FOR IMPLEMENTATION

Availability Model :

Availability is an important requirement to the trust management service. Thus, we propose to spread several distributed nodes to manage feedbacks given by users in a decentralized way. Load balancing techniques are exploited to share the workload, thereby always maintaining a desired availability level. The number of TMS nodes is determined through an operational power metric. Replication techniques are exploited to minimize the impact of crashing TMS instances. The number of replicas for each node is determined through a replication determination metric that we introduce. This metric exploits particle filtering techniques to precisely predict the availability of each node [96].

Credibility Model :

The credibility of feedbacks plays the important role in the trust management services and the service's performance. Therefore, we propose several metrics for the feedback collusion detection including the Feedback Density and Occasional Feedback Collusion [51]. These metrics distinguish misleading feedbacks from malicious users. It also has the ability to detect strategic and occasional behaviors of collusion attacks (i.e., attackers who intend to manipulate the trust results by giving multiple trust feedbacks to a certain cloud service in a long or short



period of time). In addition, we propose several metrics for the Sybil attacks detection including the Multi-Identity Recognition and Occasional Sybil Attacks [73].

Trust Management Service's Availability :

A Trust Management Service (TMS) provides an interface between users and cloud services for effective trust management. However, guaranteeing the availability of TMS is a difficult problem due to the unpredictable number of users and the highly dynamic nature of the cloud environment. Approaches that require understanding of users interests and capabilities through similarity measurements or operational availability measurements (i.e., uptime to the total time) are inappropriate in cloud environments. TMS should be adaptive and highly scalable to be functional in cloud environments [105].

Cloud Services Protection :

It is not unusual that a cloud service experiences attacks from its users. Attackers can disadvantage a cloud service by giving multiple misleading feedbacks (i.e., collusion attacks) or by creating several accounts (i.e., Sybil attacks). Indeed, the detection of such malicious behaviors poses several challenges. Firstly, new users join the cloud environment and old users leave around the clock. This consumer dynamism makes the detection of malicious behaviors (e.g., feedback collusion) a significant challenge. Secondly, users may have multiple accounts for a particular cloud service, which makes it difficult to detect Sybil attacks [112].

VI. CONCLUSION

The cloud supplier tries to pick out applicable servers and tack together a correct request allocation strategy to scale back energy price whereas satisfying its cloud users at identical time. To approximate its server choice area by adding a dominant parameter associated tack together an optimum request allocation strategy for every user, we have a tendency to style a utility operate which combines cyberspace profit with time potency and take a look at to maximise its price beneath the strategy of the cloud equilibrium. We solve the matter by using variational difference theory and prove that there exists a generalized nash equilibrium resolution set. Finally, We consider to propose associate repetitive formula, that characterizes the total method of our projected service mechanism. Conducting some numerical calculations to verify our theoretical analysis. The experimental results show that we will cut back energy price and improve users utilities to bound extent by configuring correct methods.

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Language, Python at IDE'S, R Language, JULIA, GO, SCALA, D-Language, SWIFT as well. **ResearchGate Score (R^G)**, **SSRN** – Social Science Research Network, Author ID : 3976689. **ORCID** – Open Researcher & Contributor ID : orcid.org/0000-0003-4497-5494, **PATENTS – 12 Nos., International AUSTRALIA Patents – 4 Nos. CANADA & INDIAN Copyright – 2 Nos.**

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