HYBRID OPTIMIZATION BASED VIRTUAL MACHINE MIGRATION AND VIOLATION DETECTION IN COMMUNITY CLOUD ENVIRONMENT

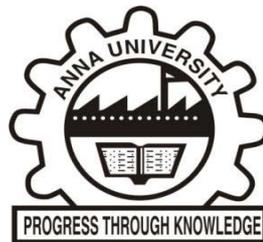A THESIS

Submitted by

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ABSTRACT

The cloud-based innovation is steadily growing and the cloud-based advancement is consistently developing and will continue in future. Cloud computing is very helpful for users to outsource large tasks to cloud data centers for performing their tasks. However, the cloud data center provides the resources, such as RAM, CPU, bandwidth, and the storage to hosts over the internet based on their demand. Community cloud computing is a cloud deployment model in which a cloud infrastructure is built and provisioned for use by a specific group of consumers with shared concerns, goals, and interests, and it is owned and managed by the community, or by a third party. To satisfy the number of user requests by scaling up the infrastructure leads to higher resource cost and it may be underutilized when the demand is less.

The challenges in community cloud computing area are such as Resource Management, Energy Efficiency, Data Privacy and Security, Cloud Interoperability, Fault Tolerance, Data Auditability, Service Level Agreement negotiation and Management for Quality of Services. Among these issues the proposed work focuses on Cloud Interoperability and SLA negotiation. Virtual Machine (VM) is a compute resource that is hosted on servers in order to manage user requests. In community cloud, when the provider is not able to satisfy the user request then that VM is migrated to other provider in the group. VM migration is needed to reduce energy consumption, fault management, low-level system maintenance and load balancing. The cloud services are available to the users depending on the SLA (Service Level Agreement) between the cloud providers and the users. The SLA violation detection mechanism is very useful to enhance trust, avoid penalty charges and increases the profit for the cloud providers. In this research, two major contributions are presented for selection of provider for VM (Virtual Machine) migration and SLA violation detection in community cloud computing.

In the first contribution, Virtual Machine (VM) migration strategy is developed based on an optimization algorithm, named Taylor series-based Salp Swarm Algorithm (Taylor-SSA). The Taylor-SSA is designed by integrating Taylor series with SSA for facilitating the selection of providers. The proposed method is used to select the provider to migrate the VM. The VM migration is carried out by considering different parameters such as resource availability, user choice, operational cost, revenue cost and bandwidth. The performance of the proposed method is evaluated by using the metrics revenue, cost, and resource gain. The proposed method attains minimal cost and maximal resource gain and revenue.

In the second contribution, an SLA violation detection approach, named Chicken Spider Monkey Optimization-enabled Deep Belief Network (ChicSMO-based DBN) is developed for detecting the violation in cloud computing platform. SLA gives a straightforward view to the users, which incorporates the delivery ability and extent of ensured accessibility of the cloud services. If suppose the violation occurs both the parties have to be paid the penalty based on the SLA clauses. Here, the ChicSMO-based DBN is utilized for computing the scores, such as Service Level Agreement score (SLA), Cloud Service Provider score (CSP), and User Privacy Score (UPS) based on fitness value. The ChicSMO is designed newly by combining Chicken Swarm Optimization (CSO) and Spider Monkey Optimization (SMO). In this research, the feature scores are evaluated by updating the location of global and local group members in the optimization and the violation detection is carried out based on Deep Belief Network (DBN) classifier. The performance of the proposed algorithm is revealed using the evaluation metrics such as accuracy, coverage rate and F-value. The results demonstrate that the proposed method achieves better performance when it is compared with other methods. This model increases the reliability and address the QoS (Quality of Service) guaranteed issues.