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QOS-Aware Cloudlet Load Balancing In Wireless Metropolitan Area Networks

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ABSTRACT *- In wireless communication technology, cloud load balancing, more and more people rely on portable mobile devices for business, leisure, and social connections. Building a smooth application experience across several computing platforms is a huge difficulty in this case.These Proposed approach cloudlets providing services such as offloading code and application to a cloudlet for processing the application tasks, providing cache services and data storage for data storage, processing and retrieval and improving the network QoS by providing flexible mechanisms to optimize different network component.*

I. INTRODUCTION

A novel system model to capture the response time delays of offloaded tasks and formulate an optimization problem with the aim to minimize the maximum response time of all offloaded tasks. We then propose two algorithms for the problem: one is an Ant colony Optimization (ACO), and another is a distributed genetic algorithm (GA) that is capable to deliver a more accurate solution. In our proposed work, we used Ant colony optimization algorithm with travelling salesman problem. TSP is one of the well-known and extensively studied problems in discrete or combinational optimization and asks for the shortest roundtrip of minimal total cost visiting each given node When server gets overloaded this method gives the solution for finding the minimum distance from one node to neighboring nodes. Here, we used temporary memory to store the previous executed requests; it reduces the time.

A major problem that WMAN service providers face is how to allocate user task requests to different cloudlets so that the workload among cloudlets in the WMAN are well balanced, thereby shortening the response time delay of tasks and enhancing user experience in the use of their service. A typical solution to this problem is to allocate user requests to their closest cloudlets to minimize the network delay, however this approach has been demonstrated to be inadequate in an WMAN setting.

Specifically, the vast number of users in the network means that the workload at each individual cloudlet will be highly volatile. If a cloudlet is suddenly overwhelmed with user requests, the task response time at the cloudlet will increase dramatically, causing lag in the user applications and degrading user's experiences.

To prevent some cloudlets overloaded, it is crucial to assign user requests to different cloudlets such that the workload amongst the cloudlets is well balanced, thereby reducing the maximum response time of offloaded tasks. We first introduce a novel system model to capture the response time delays of offloaded tasks and formulate a novel optimization problem - the cloudlet load balancing problem (CLBP).We then propose a fast heuristic algorithm that delivers a feasible solution to the problem. We also develop a distributed hybrid genetic algorithm and Ant colony optimization that delivers a more accurate solution to the problem at the expense of a longer running time. We finally evaluate the performance of the proposed algorithms in realistic simulation environments.

II. LITERATURE REVIEW

2.1 A GENETIC-ALGORITHM-BASED APPROACH FOR TASK MIGRATION IN PERVASIVE CLOUDS

A hereditary calculation (GAs-) based methodology that successfully tackled the issues of multi target advancement. A hereditary calculations based methodology can be utilized to settle on choices on the best way to allot assignments to cloud hubs and how to move undertaking in pervasive mists. Distribution methodologies are utilized for improved arrangements and framework can make utilization of the picked assignment plan to execute client errands. The GA based methodology gives the best answer for assignment movement in cloud environment.

2.2 ACO BASED TASK SCHEDULING ALGORITHM FOR HYBRID CLOUD

ACO based framework that expands the benefit of cloud administration supplier by outsourcing assignment to outer cloud when its assets are insufficient. ACO out plays out the current SLPSO (Self-versatile learning PSO)

and gives advanced booking. The ACO based framework diminishes reaction time (making it more responsive) and throughput as contrasted and existing SLPSO framework. Creators proposed ACO-LB (ACO based Load Balancing) to focus on the lop- sidedness of errand burdens allotted to VMs amid undertaking booking. Heuristics based assignment planning plans neglects to consider the heap unevenness. Another issue with planning in cloud is alert entry rate of undertakings. Arrangement proposed in this paper can adjust to element environment of mists. The reproduction based investigation set up execution capacities of ACO-LB in Load Balancing.

2.3 CAPACITATED CLOUDLET PLACEMENTS IN WIRELESS METROPOLITAN AREA NETWORKS

The authors formulated a capacitated cloudlet placement problem that places K cloudlets to some potential locations in an WMAN with the objective to minimize the average cloudlet access delay between mobile user requests and the cloudlets serving the requests of the mobile users under the computing capacity constraints on different cloudlets. They devised approximation algorithms with guaranteed approximation ratios for the problem.Although they dealt with the average delay of offloaded tasks, they didn't incorporate the queuing time delay and the work load at each cloudlet into consideration.

2.4 A GENETIC ALGORITHM INSPIRED TASK SCHEDULING IN CLOUD COMPUTING

Cloud computing carved itself as an emerging technology which enables the organization to utilize hardware, software and applications without any upfront cost over the internet. The challenge before the cloud service provider is, how efficiently and effectively the underlying computing resources like virtual machines, network, storage units, and bandwidth etc. should be managed so that no computing device is in under-utilization or overutilization state in a dynamic environment.

A good task scheduling technique is always required for the dynamic allocation of the task to avoid such a situation. Through this paper we are going to present the Genetic Algorithm based task scheduling technique, which will distribute the load effectively among the virtual machine so that the overall response time (QoS) should be minimal.

A comparison of this Genetic Algorithm based task scheduling technique is performed on CloudSim simulator which shows that, this will outperform the existing techniques like Greedy based, first – Come first – Serve (FCFS) techniques.

III. EXISTING SYSTEM

The mobile device for various cloud-based mobile applications. Genetic algorithm (GA) based scheduling strategy achieves load balancing and reduces dynamic migration. Ensures in satisfying the users' demand with high QoS and load balancing. GA, Task scheduling -QoS, and Heuristic algorithms initially perform scheduling followed by the load balancing but do not consider concurrent monitoring system. Even though the existing task scheduling algorithms provide QoS and achieve load balancing in a stringent mobile cloud environment, many priorities based scheduling techniques affect the low priority of users. The scheduling strategy suffers by the uncertainty when there is the waiting time of the task is high in the queue. Also, the existing migration based load balancing after scheduling the task increases the processing delay.

LIMITATIONS IN EXISTING SYSTEM

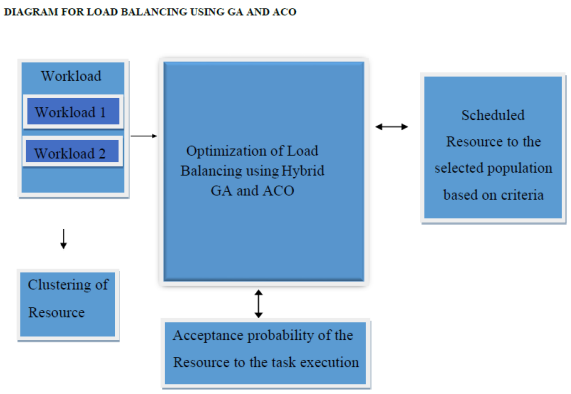
- Low priority of users.
- Scheduling strategy suffers is the waiting time of the task is high inthe queue.
- Processing time delay

IV. PROPOSED SYSTEM

The proposed approach is these cloudlets providing services such as offloading code and application to a cloudlet for processing the application tasks, providing cache services and data storage for data storage, processing and retrieval and improving the network QoS by providing flexible mechanisms to optimize different network component. a novel system model to capture the response time delays of offloaded tasks and formulate an optimization problem with the aim to minimize the maximum response time of all offloaded tasks. We then propose two algorithms for the problem: one is an Ant Colony Optimization (ACO), and another is a distributed genetic algorithm (GA) that is capable to deliver a more accurate solution. In our proposed work, we used Ant colony optimization algorithm with travelling salesman problem. TSP is one of the well- known and extensively studied problems in discrete or combinational optimization and asks for the shortest roundtrip of minimal total cost visiting each given node when server gets overloaded this method gives the solution for finding the minimum distance from one node to neighboring nodes. Here, we used temporary memory to store the previous executed requests; it reduces the time.

4.1 ADVANTAGES OF PROPOSED SYSTEM

- Reduce the chances of overloading.
- Reduce the waiting time.
- Scheduling is carried out by the size of task.



The system is proposed to have the following modules:

4.2 CLOUD ARCHITECTURE CONSTRUCTION

Cloud computing can be defined as the sharing and utilization of applications and resources within a network environment to implement the business without any concerns regarding the ownership, management and maintenance of the network's resources, applications and services.

In this module cloud architecture is created. The user will create a user space for his access in cloud space provided by a concern. Creation of cloud architecture involves allocation of virtual machine which is a mediator between user and the actual service. In this module user creates his cloud space by specifying number of virtual machine needed to act on his behalf.

4.3 TASK CREATION

In this module, task is created. Since interval scheduling mechanism is used, each task requests service from the cloud platform with a specific start and finish time. Task which has been created is stored for allocation process.

4.4 APPLYING CLUSTERING FOR PARTITIONING

Clustering is used to form group by calculating the centroid point. Clustering is chosen because initial centroid is chosen in random manner. The centroid is the mean of the points in the cluster. And Euclidean distance is used to measure the closeness. Clustering generates different clusters in different runs.

4.5 HYBRID GA AND ACO ALGORITHM

Spared by the natural features of the variable size of the population, we present a variable population-size genetic algorithm (VPGA) by introducing the "dying probability" for the individuals and the "war/disease process" for the population. Based on the VPGA and the Ant Colony Optimization (ACO) algorithms, a novel ACO-GA-based hybrid algorithm (AGHA) is also proposed in this paper. Simulation results show that both VPGA and AGHA are effective for the optimization problems. Hybrid Algorithm used to reduce the time, cost and memory.

VI. CONCLUSION

Cloudlets are an important technology that provides performance improvements to mobile applications. We have proposed the hybrid Genetic algorithm and ACO based task scheduling mechanism which clearly outperforms the other performance of the genetic algorithms in cloud computing environment. Hybrid GA and ACO based approach allocated the given tasks in such way that the minimum time required by the task scheduling.

VII. FUTURE ENHANCEMENT

As a future work, it can explore different options for the selection of the initial resource pool as it has a significant impact on the performance of the algorithm. Further, resource model can be extended by considering the data transfer cost between data centres so that VMs can be deployed on different regions. Algorithm can be extended by including the heuristics that ensure a task is assigned to a VM with sufficient memory to execution.

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