A Meta-Heuristic Approach for Scheduling the Loads in DFS For Cloud Environment Using Tabu Search

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***Abstract* - Cloud computing is one of the flourishing technologies in the present day. The cloud users are being increased day by day. So, the cloud services require better performance of the cloud. Load balancing is the mechanism that dividends the dynamic workload for all nodes in the whole cloud. The load can be cpu load, memory capacity or network load. Load balancing is the process of dividing and assigning the workload among various nodes in the distributed system to improve both resource utilization and response time of the job. Load balancing will avoid a situation where some of the nodes are doing much work while some of the other nodes are being idle in the distributed system. Load balancing ensures that all the processors in the system or every node in the network do approximately the equal amount of work at any instant of time. The main objective of load balancing algorithm is to achieve high resource utilization, best performance and user satisfaction. This paper discusses how the tabu search involves in distributed load scheduling and gives better solution towards it.**

***Keywords* - cloud computing, DFS, load balancing, tabu search.**

I.INTRODUCTION

The latest vision of large distributed computing is Cloud [1]. Cloud Computing is a concept of distributed computing in which one has the ability to run an application on many connected systems at the same time[8].Cloud computing is an Internet-based computing that share resources that are software and hardware resources on-demand from computers and other devices[2].It provides online resources and online storage to the user. It provides data at a lower cost. In cloud computing users can access resources all the time over internet. They need to pay only for those resources as much they use [3][4][5][6]. Cloud computing manages these resources and provide consumers and businesses to access advanced software applications without installation and access their personal files on any computer with internet access[2].In Cloud computing service provideroutsourced all the resources to their client. There are many standing issues in cloud computing. The key problem is load balancing in cloud computing.

Load balancing is a technique which is used to sharing the work load among the virtual machines and concluded the task. The reason behind using these techniques is to serve better to the user without any service breaking. The main profits of using cloud computing is cost, flexibility, scalability and availability to the end-users. As a major concern in these benefits, load balancing manage to scale up to increasing demands by dynamic work allocation to any or all nodes [7].Load balancing supports to distribute all loads among all the nodes. It also guarantees that every computing resource is distributed efficiently and fairly. It helps in avoiding bottlenecks of the system which may occur due to load imbalance. It provides high contentment to the users. Load balancing is a somewhat new technique that affords high resource utilization and better response time.

II.CLOUD COMPUTING

The word cloud states to the internet. Cloud computing is a kind of internet based computing, itis commonly used to describe the delivery of software, infrastructure and storage services over the internet.

SaaS(Software as a Service)

Cloud service provider hosts the service the user need not to install it, manage it, or buy hardware.Simply user can connect and use it. Email, logistics software, order management software, payroll software, and any other software they are hosted on the internet and not physically installed on your computer. Example: salesforce.com, Google Apps.

Paas(platform as a Service)

It delivers the development environment as a service.here the user can built their own applications that run on the provider's infrastructure that support transactions, uniform authentication, robust scalability and availability. Example: Google App Engine

Iaas(Infrastructure as a Servive)

It delivers infrastructure on the form of virtual hardware, storage and networking.The user does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and probably application hosting environment configurations.Example: Amazon EC2 and S3.

III.DISTRIBUTED FILE SYSTEM

A distributed file system (DFS) is a file system through data stored on a server. The data is accessed and processed as if it was stored on the local client machine. The DFS share information and files among handlers on a network in a controlled and

authorized way. The server lets the client users to share collections and store data they are storing the information locally. However, the servers have full control over the data and give access control to the clients. Allocation storage resources and information on the web is one of the important elements in together local area networks (LANs) and wide area networks (WANs). Dissimilar technologies have been established to fetch convenience to sharing resources and collections on a network; a distributed file system is one of the procedures used regularly. Individual process involved in effecting the DFS is giving access switch and storage management controls to the client system in a centralized way, accomplished by the servers. Transparency is one of the fundamental processes in DFS; subsequently files are accessed, stored, and accomplished on the local client machines although the method itself is held on the servers. This network transparency brings suitability to the end user on a client machine since the network file system efficiently accomplishes all the processes. Generally, a DFS is used in a LAN, but it can be used in a WAN or over the Internet. A DFS allows efficient and well-managed data and storage sharing options on a network compared to other options.

IV.LOAD BALANCING IN CLOUD

Cloud load balancing is a kind of load balancing that is performed in cloud computing[1]. Cloud load balancing is the method of distributing assignments through many computing resources. Cloud load balancing reduces costs associated with document organization systems and maximizes availability of resources. Cloud load balancing is the process of distributing jobs and computing resources in a cloud computing atmosphere,load balancing permits enterprises to be able to application or workload difficulties by allocating resources between several computers, webs or servers,Cloud load balancing takes in hosting the distribution of load traffic and strains that reside above the Internet. Cloud load balancing is the procedure of distributing loads and computing resources in a cloud computing environment. Load balancing allows enterprises to manage application or workload demands by allotting resources amongst several computers, networks or servers. Many cloud providers suggest cloud load balancing technologies, including Amazon Web Services (AWS), Google, Microsoft Azure and Rackspace.The mandate raises technical problems in Service Oriented Architectures and Internet of Services (IoS) grace applications, such as high availability and scalability.

CLOUD LOAD SCHEDULING

Scheduling permits the cloud in balancing the large amount of load present in the system for faster computation. It plays a vital and significant part in the execution of the load in the various heterogeneous systems. The scheduling portrays a selection of resources for the tasks of better resource utilization. In computing, schedulingis the method by which process is specified by some means is allocated to resources that finished the process. The processmight be virtual working out elements such as threads,processes or data flows, which are in opportunity scheduled onto physical components resources are processors, web links. Scheduling the tasks of a parallel application on the resources of a distributed computing platform efficiently is critical for achieving high performance. The scheduling problem has been studied for a variety of application models, such as the well-known directed acyclic task graph model for which many scheduling heuristics that have been developed. The goal of scheduling strategy is to maximize the performance of a parallel system, by transferring tasks from busy processors to other processors that are less busy, or even idle. A scheduling strategy involves two important decisions: determine tasks that can be executed in parallel, and determine where to execute the parallel tasks. A decision is normally taken either based on prior knowledge, or on information gathered during execution.

V.TABU SEARCH

Tabu search is a meta-heuristic search method that guides a local search procedure to explore the solution space beyond local optimality. The tabu search begins by marching to local minima. To avoid retracing the steps used themethod records recent moves in one or more tabulists.

Tabu List

Maintain a list of solution points that must be avoided (not allowed) or a list of move attributes that are not allowed is known as tabulist.The main objective of tabu list is to avoid cycles.

TabuTenure

Tabu tenure depends on the instance (size, etc.,)An effective range for tabu tenure can be determined experimentally.

Aspiration Criteria

When solution in the tabu list is better than the currently-known best solution, the solution is allowable to replace the currently-known solution with the best solution.

Intensification

Intensification policies are based on modifying choice rules to encourage move combinations and solution features historically found good. They may also initiate a return to attractive regions to search them more thoroughly.

Diversification

Search the unexplored area of the solution space byincrease tabutenure, Changetabu restrictions etc.,

Stopping Criteria

Maximum iterative numbers,default execution time of cpu is long.When object function's output is acceptable.

VI.IMPLEMENTATION:

In cloud computing Distributed system allows sharing, selection and aggregation of geographically distributed independent resources dynamically at runtime depending on their capacity, availability, performance, cost and quality of service. Load balancing is used to equally splitting the load to every computing node to leads to maximize the utilization and minimize the total task completing time. So, the distributed system is also necessary among the computing node to organize this work. Tabusearch is an optimization technique and it is a meta-heuristic approach. Tabu search is applied for work scheduling and is suitable for cloud computing environment to balance the load. Heuristic is the term which is used to find solutions among all possible combinations. By using this one can find the best solution with fast and easy manner. Tabu search is an intimate relation to scatter the search and path relinking. Tabu search provides broad solutions for numerous computational readings.

Step1:FS - a set of feasible solutions.

Step2:(sol) - a neighbourhood arrangement for a given solution sol€(FS) and tabulist.

Step3: An initial solution is selected from the set of feasible solutions FS. The initial solution selected in a random manner.

Step4:If it does not give best solution then it moves to the next solution si+1 from the neighbours of the current solution si, si+l € FS(si).

Step5: In tabu search all possible solutions sol € N (si) is measured and the best solution is selected as the next solution si+1.

Step6: If the above process does not give optimum solution then it performs intensification and diversification process to find optimum solution.

Tabu list saves a record of the moment of a task to a particular computing node. Moves are saved in the tabulist for a period between specified tabulist maximum and minimum values as shown in Fig.1. Each move chosen randomly with the specified period and then it checks the aspiration criteria if tabu move improves the best solution compared with normal move. Then the tabu move is accepted to process and then the intensification and diversification methods are implemented. By including further types improves the performance of the load balancing algorithm. In the search intensification the search choice rules are modified and the corresponding function is used to decide the next move. In this implementation the past good solutions are rewarded. Then it resets the tabulist with satisfied solutions. If intensification does not produce the best solution then it moves to the diversification. In diversification it resets the tabu list and generates random solution. In diversification frequently made moves are penalized, so that that moves are less likely to be chosen during this procedure. Diversification stops when the best solution was found or the final stopping criterion met.

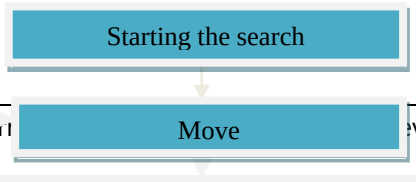

Fig.1 Tabu search flow diagram

VII.CONCLUSION

In the existing system various scheduling algorithms are used to balance the load in the cloud like round robin, least cost scheduling, min-max, min-min and so on. The grid computing uses the tabu search to balance the load among distributed systems. Tabu search is very useful to the grid computing.In the proposed system tabu search scheduling is used to balance the workload

among the distributed system to optimize performance and also avoid choking or overloading resources in cloud. Tabu search is used to find the best solution among the set of feasible solutions and takes the best solution to implement the work scheduling strategy. Like grid computing here also tabu search gives a good result to handle load scheduling in distributed systems. In future other scheduling methods are used to balance the load and to improve the performance of the cloud.

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