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Load balancing with Modify Approach

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Abstract:

Recently, various types of bandwidth eater are growing rapidly. Cloud computing as a Internet computing has become popular day by day to provide various type of services and resources to web user. Cloud computing employs Internet resources to execute large-scale tasks. Therefore, to select appropriate node for executing a task is able to enhance the performance of large-scale cloud computing environment. There are several heterogeneous nodes in a cloud computing system. Namely, each node has different capability to execute task; hence, only consider the CPU remaining of the node is not enough when a node is chosen to execute a task. Therefore, how to select an efficient node to execute a task is very important in a cloud computing.

In this paper, we propose a scheduling algorithm, LB3M, which combines minimum completion time and load balancing strategies. For the case study, LB3M can provide efficient utilization of computing resources and maintain the load balancing in cloud computing environment.

Keywords — **Cloud Computing, Load Balancing, Distributed System, Scheduling**.

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I. INTRODUCTION

Recently, Cloud computing is a new internet service concept has become popular to provide various services to user such as multi-media sharing, on-line office software, game and on-line storage. In a cloud environment, each host as a computational node performs a task or a subtask. The Opportunistic Load Balancing algorithm (OLB) intends to keep each node busy regardless of the current workload of each node [1, 2, 4]. OLB assigns tasks to available nodes in random order. The Minimum Completion Time algorithm (MCT) assigns a task to the node that has the expected minimum completion time of this task over other nodes [4]. The Min-Min scheduling algorithm (MM) adopts the same scheduling approach as the Minimum Completion Time algorithm (MCT) [4] to assign a task the node that can finish this task with minimum completion time over other nodes [5]. The Load Balance Min-Min (LBMM) scheduling algorithm [6] adopts MM scheduling approach and load balancing strategy. It can avoid the unnecessary duplicated assignment.

In this paper, we propose an efficient load balance algorithm, named Priority based Minimum Load Balance algorithm (PMLB). From the case study, PMLB achieves better load balancing and minimum completion time for completing all tasks than other algorithms such as LB3M, MM and LBMM.

The rest of this paper is organized as follows. The literature review is discussed in Section 2. Section 3 presents in detail the proposed LBMM scheduling algorithm. The research environment and process are discussed in Section 4. Section 5 describes the structure and the method of the system. Finally, Section 6 concludes this paper.

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II. LITERATURE REVIEW

Cloud computing is a kind of distributed computing where massively scalable IT-related capabilities are provided to multiple external customers "as a service" using internet technologies [13]. The cloud providers have to achieve a large, general-purpose computing infrastructure; and virtualization of infrastructure for different customers and services to provide the multiple application services.

Furthermore, the ZEUS Company develops software that can let the cloud provider easily and cost-effectively offer every customer a dedicated application delivery solution [14]. The ZXTM software is much more than a shared load balancing service and it offers a low-cost starting point in hardware development, with a smooth and cost-effective upgrade path to scale as your service grows [12,14].

The ZEUS provided network framework can be utilized to develop new cloud computing methods [14], and is utilized in the current work. In this network composition that can support the network topology of cloud computing used in our study [12, 13]. According to the ZEUS network framework and in consequence of the properties of cloud computing structure, a three-level hierarchical topology is adopted to our investigate framework.

According to the whole information of each node in a cloud computing environment, the performance of the system will be managed and enhanced. There are several methods can collect the relevant information of node that includes broadcasting, the centralized polling and agent. Agent is one of the technologies used extensively in recent years. It has inherent navigational autonomy and can ask to be sent to some other nodes. In other words, agent should not have to be installed on every node the agent visits, it could collect related information of each node participating in cloud computing environment, such as CPU utilization, remaining CPU capability, remaining memory, transmission rate, etc. Therefore, when agent is dispatched, it does not need any control or connection, and travel flow can be reducing in maintaining the system [12]. However, in this study, the agent is used to gather the related information, and reduce the resources wasting and cost.

There are different characteristics of each scheduling algorithm. Opportunistic LoadBalancing (OLB) is to attempt each node keep busy, therefore does not consider the present workload of each computer. OLB assigns each task in free order to present nodeof useful .The advantage is quite simple and reach load balance but its shortcoming is not consider each expectation execution time of task, therefore the whole completion time (Make span) is very poor [2,8]. Inother words, OLB dispatches unexecuted tasks to currently available nodes at random order, regardless of the node's current workload [1,4].

Minimum Execution Time (MET) assigns each job in arbitrary order to the nodes on which it is expected to be executed fastest, regardless of the current load on that node. MET tries to find good job-node pairings, but because it does not consider the current load on a node it will often cause load imbalance between the nodes and not adapt application in the heterogeneity computer system [1,3].

Minimum Completion Time (MCT) assigns each job in arbitrary order to the nodes with the minimum expected completion time for the job [7]. The completion time is simply the ETC, but this is a much more successful heuristic as both execution times and node loads are considered [1,3].

Min-Min scheduling algorithm establishes the minimum completion time for every unscheduled job, and then assigns the job with the minimum completion time to the node that offers it this time [9]. Min-min uses the same mechanism as MCT. However, because it considers the minimum completion time for all jobs at each round, it can schedule the job that will increase the overall make span the least. Therefore, it helps to balance the nodes better than MCT. In addition, spirit of Min-min is that every composed of the best is all minimum completion time for allocation resource. Because of OLB scheduling algorithm is very simple and easy to implement and each computer often keep busy.

In our research, the OLB scheduling algorithm is used to assigns the job and divides the task into subtask in a three level cloud computing network. In addition, in order to provide the working load balance of each computer in the system, the Min-Min scheduling algorithm will be improved in this investigates on which it is expected to be efficiently reducing execution time of each node.

III. METHOD

Step1: It is to find the Maximum Completion Time (MCT) of each task for all nodes, respectively.

Step 2: It is to find the node that has the maximum total task.

Step 3: It is to find the unassigned node that has the minimum completion time for the task selected in Step 2. Then, this task is discharged to the selected node for computation.

Step 4: If there is no unassigned node can be selected in Step 2, all nodes including unassigned and assigned nodes should be re-evaluated.

If there is more than one unassigned task with same value then we find other unassigned node of corresponding nodes that has maximum value. Then we select the node of same value corresponding to higher unassigned node. Next, this task is discharged to the selected node for computation.

Step 5: Repeat Step 2 to Step 4, until all tasks have been completed totally.

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Table 6 selects last value

Table 1

Node / Task	C_{11}	C_{12}	C_{13}	C_{14}
t_1	12	13	10	14
t_2	16	24	13	25
t_3	26	31	12	33
t_4	17	24	18	31

Table 2

Node / Task	C_{11}	C_{12}	C_{13}	C_{14}
t_1	12	13	**10**	14
t_2	16	24	**13**	25
t_3	26	31	**12**	33
t_4	**17**	24	18	31

Table 3

Node / Task	C_{12}	C_{13}	C_{14}
t_1	13	10	14
t_2	24	13	25
t_3	31	12	33

Table 4

Node / Task	C_{12}	C_{13}	C_{14}
t_1	13	10	14
t_2	24	13	25
t_3	31	**12**	33

Table 5

Node / Task	C_{12}	C_{14}
t_1	13	14
t_2	24	25

Table 6

Node / Task	C_{12}	C_{14}
t_1	13	14
t_2	**24**	25

Table 7

Node / Task	C_{14}
t_1	**14**

IV. CONCLUSIONS

In this paper we proposed an efficient scheduling algorithm, PMLB, for the cloud computing network to assign tasks to computing nodes according to their resource capability. Similarly, our approach can achieve better load balancing and performance than other algorithms, such as LB3M, MM and LBMM from the case study.

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