Identify and extract resource Conflict by Association of Resources in Cloud

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Abstract—Minimizing the number of resources and optimizing the performance are the two dipole criterion to be managed in cloud computing. Virtualization to a great extent contributes in improving the performance but creates chaos when degree of traffic increases in the cloud. The situation also goes turmoil when requests of resources becomes more often. Various techniques applied to resolve this problem has been taken in to consideration like self-Configuring Adaptive frame work work optimizing resources [1], CIVSched [2], scalable analytics for IaaS cloud availability [3] to study their impact on the issue, but the survey reflects that the problem beholds and still need to be improved and improvised. Keeping this issue in the center to analyze, the article in the end try to conclude by proposing a simplistic approach of isolation of resources with their requests. The article try to intend a scheme where Shortest Remaining Time (SRT) algorithm is applied on the cloud computing environment which try to isolate the resource request and will virtualize all the requests to fulfill as many requests as possible, the result in the article indicates an upshot in the overall performance. However, if collision of demand occurs between two or more user then the user currently accessing the resource will serve as the resource to the other user demanding it. It will eradicate the issue of denying the user to access a particular resource in use and therefore the throughput is increased. In this way, resource isolation and implementation of dual-virtualization is achieved (one through SRT and second through step-wise virtualization). This paper primarily focuses on the issue of virtualization and isolation of resources.

Keywords—Cloud, IaaS, Virtualization, SRT

I. Introduction

Cloud computing depends on virtualization for service implementation and distribute resources to the end users over the web as web services cloud provides resources to various users thus users have a complete access on the resources they require. Cloud computing helps in reducing the problem of management of individual resources as it provides an intelligent mechanism of locating all the assets required by the user on the cloud [8]. The cloud computing model provides SaaS (Software as a service), IaaS (Infrastructure as a service) and PaaS (Platform as a service) to users which can be refined as RaaS (Resource as a service) [4]. Hence, this provisionally facilitates the users to access any resource over the cloud. But this now generates the problem of congestion over the network. Mechanism of isolation of resources is not provided over the cloud therefore the resources are not intelligibly managed and maintained. Hence, there is no isolation of the resources attributed to a particular user. Latency of the resources, delay in resource access, frequent accessibility of a certain resources, unintentional ignorance of certain resources etc. are the certain tribulations arise due to non-isolation of the resources. The idle resources also results in wastage of power as more than 50% of the power is being wasted [5]. Hence resources should be isolated properly for each user through maintaining a set of resources for each user. Thus this will help in reducing the above mentioned problems as then each user will have his own array of resources frequently required by him.
resources exhibiting its availability status is being maintained.

Now, this again arises the problem of load on cloud server, as if each user will have their own set of resources then the redundancy and burden on the server will increase and thus will result in complexities in management of each resource set [9]. The scenario will get worsen if the number of users get increased multiplicatively. So, to achieve isolation, virtualization of the resources is the technique required in each set. Hence, the resources in every set should be properly utilized to properly manage the every set of resources and condense the load on cloud server. Now, to achieve this, Shortest Remaining Time is the algorithm being applied in the cloud environment.

Fig 3. Resources are being virtualized in every set.

II. Methodology

In cloud computing, data is not stored in a server or machine but the amount of computer distributed over the internet [4]. Hence the resources are also provided by the cloud server which can be implicitly used by the user. This proves to be advantageous for users as any resource required by them can be provided to them requisitely. But this can return havoc if the number of users get increase multiplicatively resulting in load on server, redundancy, extreme demand-collision etc. To sharply achieve the resource isolation, an effective method of virtualization is essential to be implemented. Hence virtualization in every set is achieved by applying Shortest Remaining Time (SRT) algorithm through which resources in every set could be virtualized by maintaining a queue through which resource requiring minimum time to execute is processed first And, overall resources are maintained and their availability status is exhibited through client representing as resource which has a complete access to that resource to another client demanding it. Here, the concept of dual-virtualization is introduced.

A. Isolation of Resources in Cloud Environment

As cloud provides users with resources required by individual User, this also can lead to numerous latency and security issues which can result in space and time complexities in cloud environment. To overcome these, coalition and isolation of resources could be done by providing respective user with respective resource set comprising of the resources demanded by the user. The resource set is produced each time the resource is demanded by the user resulting in the reduction of time required and elimination of the domain of collision of demands of users each time the resources are demanded and need of allocation is required.

Every time a queue is maintained for each resource containing the sequence of all users requesting require additional participation of energy consuming elements thus results in supplementary problems of energy consumption, etc. in the non-isolated cloud environment. Therefore if the resources are isolated in accordance with that required by user at a particular instance of time, then it will be able to solve the issues of latency and security up to some extent. Hence, isolation of resource is the best method to eradicate the probability of collision, network interference etc. In an isolated environment, the user gets maximum from the cloud and hence the overall throughput is enhanced.

In any user-resource environment, the throughput $o$ can be calculated as:-

$$O = \frac{T}{S}$$

Where $T$ is the total number of resources and $S$ is the total time. Then in Fig 1, let the throughput be $o_1$ such that if in any resource isolated environment with as many resource and users as in Fig 1, then if the throughput in non-sharable environment will increase, then definitely in sharable environment will also increase such that:-

$$o_1 \propto t$$

So, $o_1 = dt$ where $d<1$

$$d = \frac{L}{r}$$

Where $r$ is the total number of resources and $L$ is the latency constraint. ‘d’ is the delay constant which is a factor arise due to latency and complex administration required in sharable environment.
But in non-sharable (isolated) environment, resources are occupied as at least one resource in every set is utilized or in use every time unlike in non-isolated environment where some delay occurs due to latency. Hence, it can be concluded that throughput is definitely increased in an isolated cloud environment.

B. Limitation of Isolation of Resources

Though isolation of resources can avoid the problem of network interference, collision, latency, ignorance of a particular resource etc. but it results in additional load on server, redundancy of resources etc. Thus, it again becomes the Problem.

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>Table differentiating isolated and non-isolated Cloud environment</th>
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</thead>
<tbody>
<tr>
<td>USER</td>
<td>RESOURCES IN ISOLATION SET</td>
</tr>
<tr>
<td>U2</td>
<td>R1</td>
</tr>
<tr>
<td></td>
<td>R2</td>
</tr>
<tr>
<td></td>
<td>R3</td>
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</tbody>
</table>

Consider the isolation set of user U2 containing the resources R1, R2 and R3. Now, the set is being virtualized by applying the scheduling algorithm of Shortest Remaining Time. Suppose, resource R3 requires the processing time of .7 ms, R1 requires execution time of .9 ms and R2 requires .3 ms, then R2, which requires least execution time than other resources is positioned in the processing queue and this way, other resources in the set(R1 and R3) are virtualized until R2 is being processed.

C. Virtualization Technique Applied on Each Set (Through SRT Algorithm)

In each resource set, virtualization is done by applying the technique of Shortest Remaining Time algorithm. In each set, resources are virtualized according to their processing time. In a resource set, a queue is maintained for each resource containing the requests to the resource. Then the request requiring minimum execution time to execute is processed first. Hence, while this processing; all other resources are simply non-existing in the resource set.

Therefore, this intelligently implements virtualization.

Hence, this way the resources are being prioritize in every individual set to compensate its heavy load and apply virtualization. However, condition may occur that a resource may be requested by two or more users. Such condition results in collision of demands.
of the user. Its outcome is the conflict of allocation strategies.

D. Overcoming Demand-Collision of Users (Through Step-Wise Virtualization)

The collision of demand may arise in a situation such that if a user requests a resource confined or in use by the other user. In such condition, an effective solution should be provided to solve this conflict between the users [7]. The concrete concept of dual-virtualization could be used to solve this deadlock alike condition. In this methodology, a local virtualization in every set is provided which make resources virtualizing through implementing Shortest Remaining Time algorithm as the resource requiring the minimum executing time is entered into the queue first and accessed first and rest all resources in the set are virtualized. And when the conflict of demands occurs between the users then the client accessing the resource presently will act as a resource to the other client. The access of resource is not denied but presented in a disguise form through other client masked as the resource.

Suppose, R2 is the resource present in the set of both U1 and U2 and having the least processing time for both the users and is first in the processing queue of both U1 and U2. Now, as the execution is not parallel but sequential therefore any one client would be given the access to the resource first and the other user is not refused of the resource access but the client accessing the resources will act as the resource for the waiting client.

Suppose U1 accessed R1 first, then U2 and U3 are not kept waiting or refused. U1 is being provided as R2 to U2, and now as U2 is indirectly accessing R2 therefore U2 is being disguised as R2 for U3 and hence in this way step-wise virtualization is taking place. Step wise virtualization is a chained mechanism which prevents the client from being denied for the resource and if client has accessed even 1% of the resource then also it can participate in deriving the resource to another client and the efficiency gets multiplicatively increased.

III. Conclusion

The cloud computing constructs upon advances on virtualization to support cost-efficient usage of computing resource and delivers the end target with quality of service. The resources are widely located over the server which is when isolated, results in increased throughput. But, virtualization is the need of isolated cloud environment to compensate load and resource redundancy issues on the server. The concept of dual-virtualization proves is proved to be a high point as dual maintenance of resources one which is inside each set and one universal administration is done[6]. In local management, virtualization of resources are done on the priority of the Shortest Remaining Time(SRT) according to which resource requiring minimum processing time is added first in the queue and being processed. In universal administration, if the collision of demand occurs between two or more users containing the same resource in their set requiring the minimum time to execute in every set then a collision avoidance mechanism is needed which is achieved through step-wise virtualization in which a resource being accessed by a particular client is when demanded by the other then the client gets disguised as the resource as it has accessed a part of resource successfully which it can exhibit to the client demanding it and this chain gets extended when during this process, other demand occurs for the process. This isolation and dual-virtualization algorithm will provide an edge over the cloud computing environment making it more secure, isolated, efficient, administered and sophisticated.

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