

# An Enhanced and Secure Approach of Load Balancing in Cloud Computing

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**Abstract**— The load balancing problem is the most divergent job to be achieved while dealing with Cloud Computing. Along with load balancing accomplishment, various access Control mechanisms are to be forked with. DAC, MAC, RBAC are such access controls that have already been developed. But as the number of clients are trafficking the network, so do the problems. This paper deals with all such problems which are posing a great threat to the users while accessing the internet. It does all this by checking the specifications of virtual machines by the use of surveys. It will help in saving time as well as cost factor.

**Keywords**— Cloud Computing, Load Balancing, Queuing Problem, Job Mapping Policy, Distributed Policy, ASP.NET

## I. INTRODUCTION

Cloud Computing is the technique to allow various users to access services over a single network[1]. Load balancing is a technique to allot the load of the users on various nodes of the network. It is done so as to make resource utilization effective and to improve the response time of the job, simultaneously Removing a condition in which some of the nodes are over loaded while some others are under loaded.

### A. Scheduling in Cloud Computing:

Scheduling is a process of assigning jobs to the respective queues. They can be assigned according to the priority set. This can be according to the first come, first serve policy or role based access control policy. As the job arrives, if the queue is empty, it will be assigned to the queue else it will wait for that queue. Jobs can be pre-empted even if a higher authority person comes.

## II. PROPOSED WORK

In the proposed work, all the 4 policies i.e. FCFS, RBAC, Job Mapping and virtualization are merged. In this work, firstly FCFS algorithm would be applied and jobs would be executed on the basis of this algorithm then RBAC architecture would be implemented and some restrictions would be made on the basis of this architecture. Job mapping policy would be implemented in our work with distributed policy with the help of priority concept which will help to reduce the burden of the executor.

### A. First Come First Serve Scheduling:

This Algorithm is simple and fast. In this algorithm, as name specifies the resource is scheduled to that task which comes first. This is very simple in nature. In this scheduling queue method for scheduling is used. The first task that is requested for resources is placed at first place in the queue[4] and the task which comes second is placed at second place and so on. The resources are allocated according to their position in the queue. The jobs coming for execution are placed in the

rear position and the jobs that were already in the queue are executed from the head position. But this may lead to convoy effect when shorter I/O processes have to wait for long time for large CPU process.

Hence, FCFS is only applied to put jobs in a respective Queue. But it does not overcome the problem of load balancing. For the load balancing concept, other 3 techniques are implemented.

Scheduling is performed wherever the jobs executing should be performed. It works as a compulsion for the jobs. Without the scheduling process, the execution should be like the jobs moving without any order and no load balancing should be performed then.

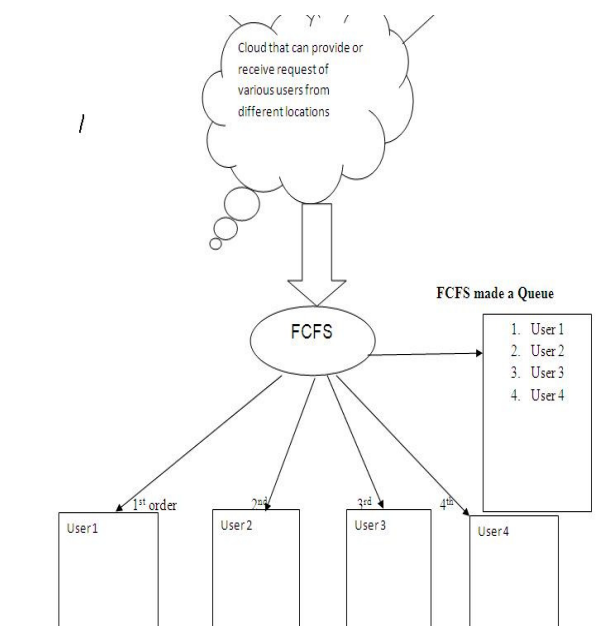


Fig.1 Working of FCFS

### B. Scheduling through RBAC:

RBAC[14] is role based access control mechanism. In this, higher priority job is executed first. Restrictions are also made on the jobs according to the roles. Hence a proper security mechanism is applied on the jobs. Then FCFS is also applied so as to give execution a criteria of priority. But it creates a problem when any job is dependent on any other job's execution. To overcome this problem, a job mapping policy is applied.

### C. Job Mapping Policy:

Jobs are mapped when there is dependency between the jobs. Suppose the job 1 should be executed only after job 3. So job 1 depends on job 3 for its execution. Hence job 1 should be mapped to job 3 for its execution. Afterwards, execution of job 2 will take place. Job mapping helps in Load Balancing in a great manner. It helps to reduce the execution time of the jobs. In short, independent jobs are executed before the dependent jobs. But this will not balance the traffic of the nodes. To overcome this, Virtualization is used.

### D. Virtualization:

Virtualization is a technique of allocating the jobs to the virtual machines. Virtual machines[3] act as an illusion only. In reality jobs are fed to resources only which further map them to virtual machines. This is done to divide the workload of nodes among them. Overload machines put their overloaded load on the under loaded nodes. Hence, helping in proper resource utilisation and less execution time.

So in this, access management as well as identity management along with load balancing is performed in ASP.NET environment. Firstly a cloud environment is created using an admin as a server who can manage the jobs as well as resources and virtual machines. Then creating the clients who want to have access to their jobs. After creating the environment, all the policies are applied using the stored procedures at the backend i.e. SQL Server 2005.

The reason for using Visual Studio for simulation is to provide real time environment. So that any changes, updations can be done whenever required as per user's requirements. Any MNC or any large organization use .NET as their cloud keeping in mind this reason. Following it, a cloud environment is created first using .NET and then the jobs are virtually given to the virtual machines dynamically using random function.

The following flowchart briefly describes the flow of the work done:

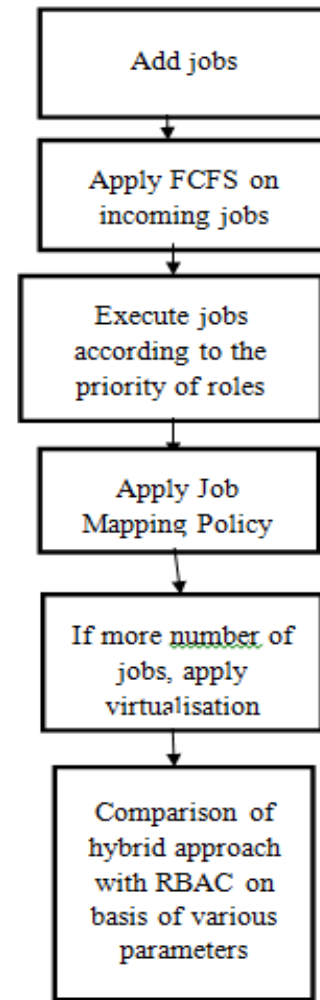


Fig.2 Flowchart describing the steps of Work done

## III.RESULTS &DISCUSSIONS

In the present work after creating the cloud environment, the following scenarios are designed. For these different scenarios, the performance i.e. results are calculated and evaluated. These different scenarios are described below:

- Scenario 1:** In the first scenario, the FCFS policy is applied. Jobs of the users are fed into the cloud environment where they are served according to the first come first serve service. Until the job demanding first for the resource gets executed, second job fed can't be executed. This is whole done by calculating the performance based on response time and numbers of resources utilized parameters.

16 jobs are taken which are fed into cloud environment being developed. According to FCFS, as the job arrives, it is executed. The timing Graph is shown in following snapshot:

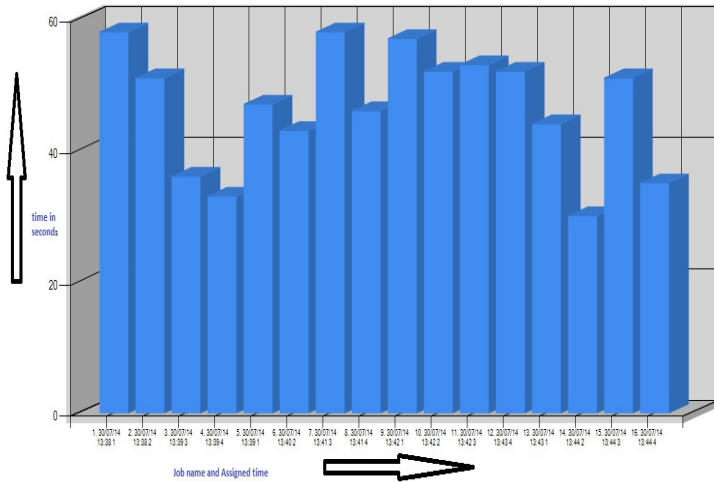


Fig. 3 Timing Graph of FCFS

The next parameter used is resource utilization which is main parameter while calculating load balancing in cloud computing. Results calculated are as follows:

Number of Jobs

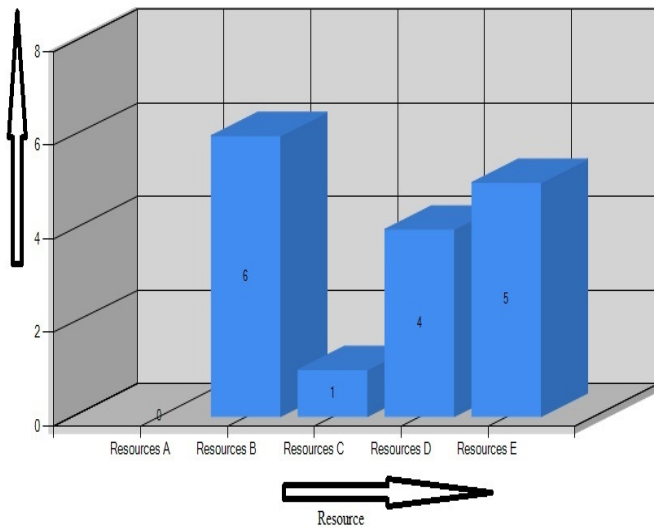


Fig. 4 Resources Utilization Graph of jobs executed in FCFS order

- **Scenario 2:** In the second scenario, RBAC i.e. Role Based Access Control is used to measure the performance of the cloud services. The job that is most important i.e. the job which has higher role is executed first. The whole performance I based on the same parameters that are response time and the number of resources utilized.

16 jobs are taken which are fed into cloud environment being developed. According to RBAC, as the job arrives, it is executed according to the priorities of their roles and then FCFS is applied again. The timing graph is shown in following snapshot:

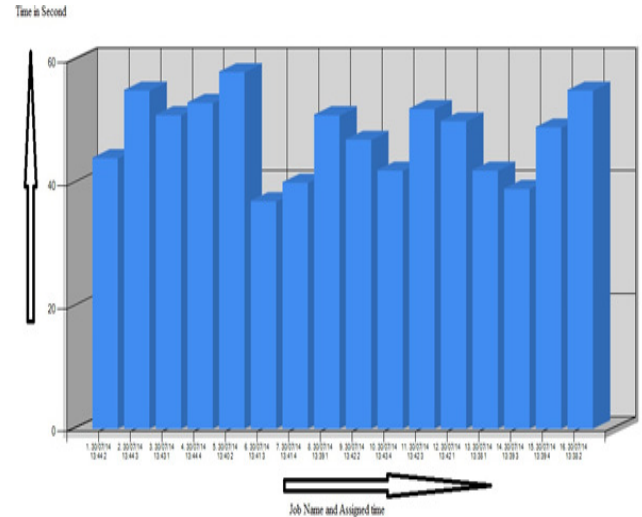


Fig.5 Timing Graph of clubbed approach of FCFS and RBAC.

The resource utilization graph is shown as:

Number of Jobs

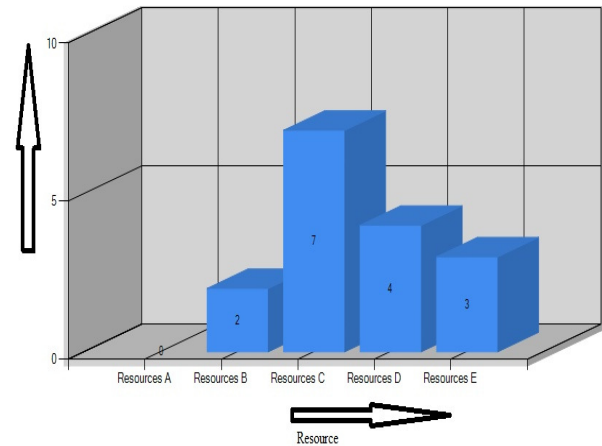


Fig. 6 Resource Utilization of clubbed approach of FCFS and RBAC

- **Scenario 3:** In the third case, Job mapping policy is applied. If any job is dependent on any other's jobs execution then they will take more time to execute. First non-dependent jobs are executed, afterwards the dependent jobs are executed. Then the performance is calculated based on response time and the number of resources utilized graphs.

16 jobs are taken which are fed into cloud environment being developed. According to job mapping, If any job is dependent on any other's jobs execution then they will take more time to execute. First non-dependent jobs are executed, afterwards the dependent jobs are executed. The timing graph is shown as:

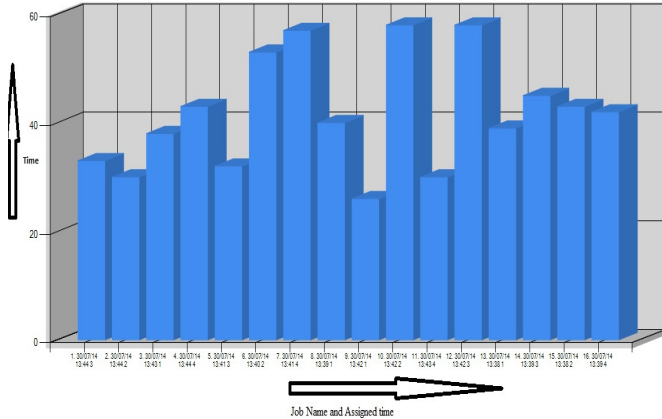


Fig.7 Timing Graph of clubbed approach of FCFS and RBAC and Job Mapping Policy.

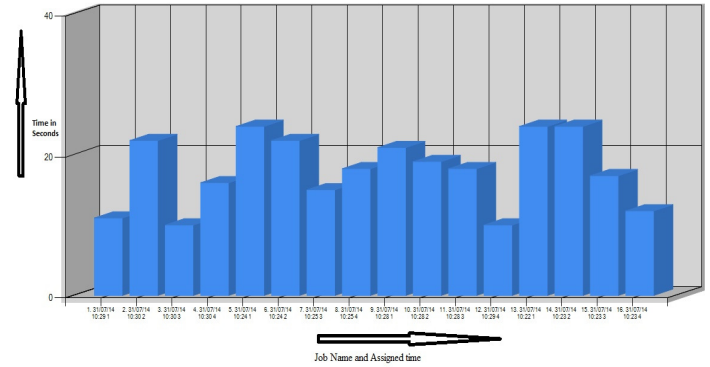


Fig. 9 Timing Graph of Hybrid approach

The resource utilization graph is shown as:

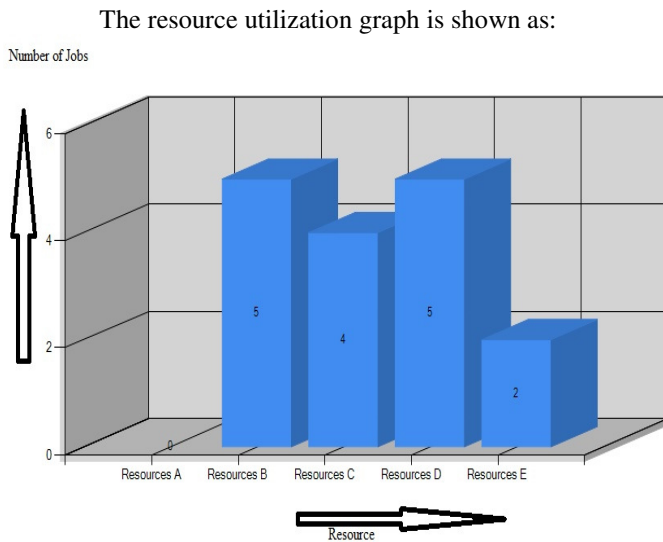


Fig. 8 Resource utilization Graph of job Mapping

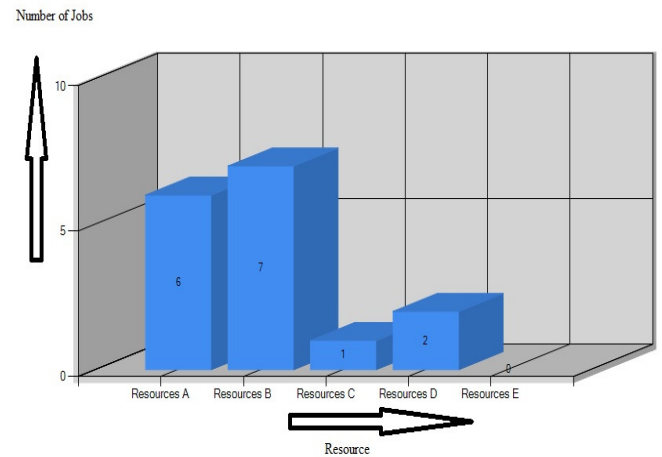


Fig.10 Resource Utilization Graph of Hybrid Approach

- Scenario 4:** In the fourth case, Virtualization is applied which is the root of load is balancing in Cloud Computing. The jobs are fed into various virtual machines so that only single virtual machine cannot be exhausted due to overburden of load of nodes. Then the performance is calculated by measuring the response time of jobs and the number of resources utilized.

16 jobs are taken which are fed into cloud environment being developed. According to virtualization concept, the jobs are fed into various virtual machines so that only single virtual machine cannot be exhausted due to overburden of load of nodes. The timing graph is shown as:

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