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Cross-Breed Job Scheduling for Reducing the Server Load Using RBAC at Cloud

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Abstract— As the cloud computing is a new style of computing over internt. It has many advantages along with some crucial issues to be resolved in order to improve reliability of cloud environment. These issues are related with the load management, fault tolerance and different security issues in cloud environment. In this paper the main concern is load balancing and security issues in cloud computing. The load can be CPU load, memory capacity, completion time of each job and security issues to prevent the data from unauthorized user. From decades well known algorithms like FCFS, Priority has been seen into action to reduce the server load. But with the increase in the complexity of the server needs, they have failed to cope up with the current scenario. In our approach, we are developing a technique named Cross Breed Job scheduling technique which would be a combination of FCFS, Priority and would be monitored by RBAC (Role based access control). RBAC is a system which checks that whether the user of the system has the access to particular content or not. If the user doesn't have the access to the content, he will be denied and the server's load would be minimized.

Keywords— Cloud computing, Load balancing, Cross breed job scheduling technique, Role based access control, First come first serve, Priority Scheduling.

I. INTRODUCTION

Cloud computing is the evolving paradigm with changing definitions but for this research project, it is defined in the term of a virtual infrastructure which can provide shared information and communication technology services, via an internet "cloud," for "multiple external users" through use of the Internet or "large-scale private networks." Cloud computing provides a computer user access to Information Technology (IT) services i.e., applications, servers, data storage, without requiring an understanding of the technology or even ownership of the infrastructure. To comprehend cloud computing, an analogy to an electricity computing grid is to be useful. A power company maintains and owns the infrastructure, a distribution company disseminates the electricity, and the consumer merely uses the resources without the ownership or operational responsibilities. Cloud computing is a subscription-based service where you can obtain networked storage space and computer resources. One way to think of cloud computing is to consider your experience with email. Your email client, if it is Yahoo!, Gmail, Hotmail, and so on, takes care of housing all of the hardware and software necessary to support your personal email account. When you want to access your email you open your web browser, go to the email client, and log in. The most important part of the equation is having internet access. Your email is not housed on your physical computer; you access it through an internet connection, and you can access it anywhere. If you are on a trip, at work, or down the street getting coffee, you can check your email as long as you have access to the internet. Your email is different than software installed on your computer, such as a word processing program. When you create a document using word processing software, that document stays on the device you used to make it unless you physically move it. An email client is similar to how cloud computing works. Except instead of accessing just your email, you can choose what information you have access to within the cloud. Similarly, a user's cloud computing access enables "shared resources, software, and information on-demand" on a fee-for-service basis.

More exactly Cloud computing can be expressed as a combination of:

1. Software as a Service (SaaS):

Software as a service (**SaaS)** sometimes referred to as "on-demand software", is a software delivery model in which software and associated data are centrally hosted on the cloud. SaaS is typically accessed by users using a thin client via a web browser.

2. Platform as a Service (PaaS):

Platform as a service (**PaaS**) is a category of cloud computing services that provide a computing platform. Along with software as a service (SaaS) and infrastructure as a service (IaaS), it is a service model of cloud computing. In this model, the consumer creates the software using tools and/or libraries from the provider. The consumer also controls software deployment and configuration settings. The provider provides the networks, servers, storage and other services.

3. Infrastructure as a Service (IaaS):

Infrastructure as a Service (IaaS) manages a large set of computing resources, such as storing and processing capacity. Through Virtualization, they are able to split, assign and dynamically re-size these resources to build ad-hoc systems as demanded by customers. It offers the hardware as a service to a organization so that it can put anything into the hardware according to its will.

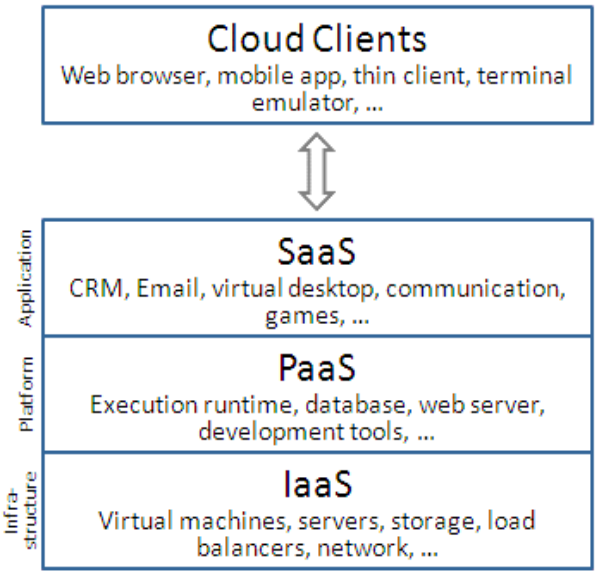

Fig.1 Cloud computing services

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II. LOAD BALANCING

Load balancing is a computer networking method to distribute workload across multiple computers or a computer cluster, network links, central processing units, disk drives, or other resources, to achieve optimal resource utilization, maximize throughput, minimize response time, and avoid overload. Using multiple components with load balancing, instead of a single component, may increase reliability through redundancy. The load balancing service is usually provided by dedicated software or hardware, such as a multilayer switch or a Domain Name System server.

Load balancing in cloud computing:

Load Balancing is a method to distribute workload across one or more servers, network interfaces, hard drives, or other computing resources. Typical data centre implementations rely on large, powerful (and expensive) computing hardware and network infrastructure, which are subject to the usual risks associated with any physical device, including hardware failure, power and/or network interruptions, and resource limitations in times of high demand. Load balancing in the cloud differs from classical thinking on load-balancing architecture and implementation by using commodity servers to perform the load balancing. This provides for new opportunities and economies-of-scale, as well as presenting its own unique set of challenges. Load balancing is used to make sure that none of your existing resources are idle while others are being utilized. To balance load distribution, you can migrate the load from the source nodes (which have surplus workload) to the comparatively lightly loaded destination nodes. When you apply load balancing during runtime, it is called dynamic load balancing — this can be realized both in a direct or iterative manner according to the execution node selection:

• In the iterative methods, the final destination node is determined through several iteration steps.
• In the direct methods, the final destination node is selected in one step.

An n another kind of Load Balancing method can be used i.e. the Randomized Hydrodynamic Load Balancing method, a hybrid method that takes advantage of both direct and iterative methods.

Goals of Load balancing:

1. To improve the performance substantially.
2. To have a backup plan in case the system fails even partially.
3. To maintain the system stability.
4. To accommodate future modification in the system.

III. PROPOSED CROSS-BREED JOB SCHEDULING TECHNIQUE

The Proposed Cross breed technique is the combination of:

- Role Based Access Control (RBAC)
- First Come First Serve (FCFS)
- Priority Scheduling

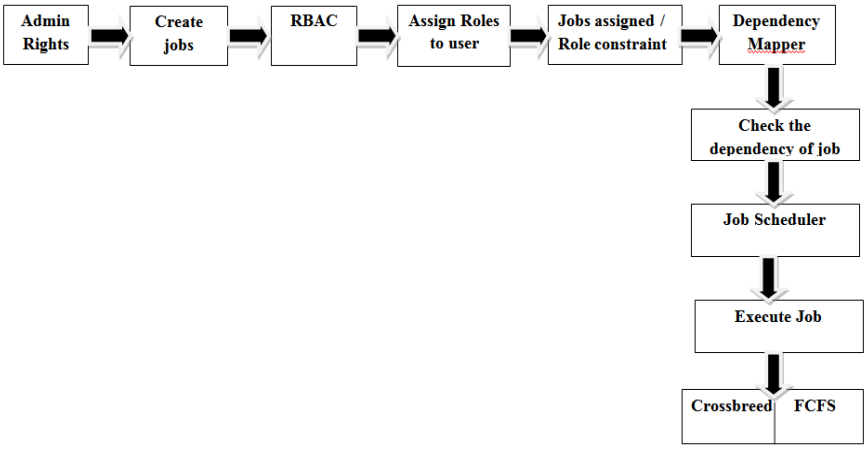

Fig.2 Cross-breed Job Scheduling Technique

The Cross-Breed Job Scheduling Technique is proposed to reduce the load at the cloud by using RBAC. The Flow Chart shows the working of the technique.

1) ***Admin Rights:*** **-** In an organization admin creates the jobs and map the dependency between them.
2) ***Role based access control*** :- In computer systems security, **role-based access control** (**RBAC**) is an approach to restricting system access to authorized users. Roles are created for various job functions. The permissions to perform certain operations are assigned to specific roles.
3) ***Assign Roles to user***: - Admin will assign roles to the system users, and through role assignments acquire the computer permissions to perform particular computer-system functions. Since users are not assigned permissions directly, but only acquire them through their role (or roles).
4) ***Job Assigned*** :- A job is assigned to a particular user according to their role, if a user want to access a job other than their role then due to role constraint the user cannot have the accsee to that job.
5) ***Dependency Mapper*** :- The job that a user can have the access is mapped with the other jobs to check the dependency.
6) ***Job Scheduler*** :- Job Scheduler executes the jobs, If the job is dependent on another job, then the job scheduler will check the priority of the dependent job, if the dependent job has higher priority then it will be executed.
   But if the job is dependent on more then one job and the priority of the jobs are same then according to FCFS scheduling algorithm the job which comes first will be executed first.
   The result is compared by First Come First Serve Scheduling and Cross-Breed job Scheduling on the bases of following parameters:
   a. Total no. of jobs executed in the given interval of time.
   b. CPU Burst Time
   c. Energy consumed by CPU.
   d. Average Completion Time of the jobs.

IV. CONCLUSIONS

In this paper, we proposed an efficient scheduling algorithm, Crossbreed job scheduling, for the cloud computing network to reduce the load by using RBAC. Similarly, Crossbreed job scheduling can achieve better load balancing and performance than FCFS scheduling technique.

It is expected that the job load will be reduced by implementing the RBAC along with the FCFS and the Priority scheduling concept because the RBAC will restrict the system from unauthorized access to the server where as the priority scheduling will speed up the concept of execution.

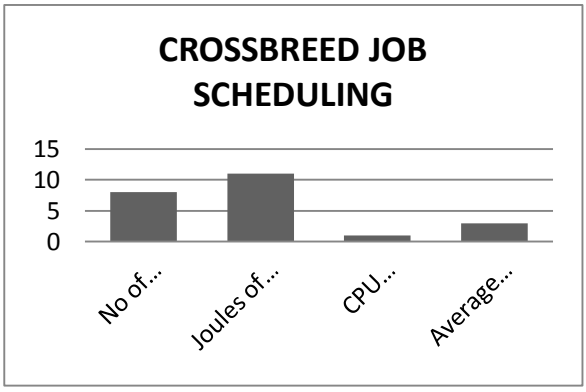

Fig.3 Crossbreed job scheduling results

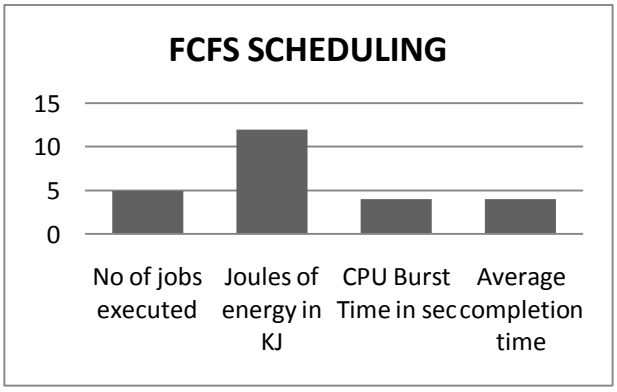

Fig.4 FCFS scheduling results

FUTURE SCOPE

In the future, if some mechanism would be applied so that one id can make a fixed number of transactions, then admin will come to know through its monitoring system that unauthorized access has been made and it would be easier to take action against such happenings and also if some concept could be applied over the priority as there is no such rule that if a job is of lower priority but a less execution time, it should proceed first can make the system go faster.

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