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COMPENDIOUS ELUCIDATION LOAD BALANCING TECHNIQUES IN CLOUD COMPUTING

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ABSTRACT

Cloud computing is the world of technology that makes pool of resources available around the users as per the demand made by users. IT companies which offers cloud services captures the market shares at large extent and provides benefits to the client as well as service providers. Cloud computing provides pool of resources to the user virtually. This study, discusses some points that enlightens how the cloud computing technology changing the world. The study discusses the various services offered by cloud and how virtualization is implemented by using cloud services. The study provides the information about the beneficial points of virtualization and the ways by which the virtualization can be applied. Moreover, the study discusses the concept of load balancing and the scheduling algorithms like round robin, throttled, active monitoring.

Keywords*: Cloud Computing, Virtualization, Types of Virtualization, Load Balancing, Load Balancing Algorithms.*

I.   INTRODUCTION

Cloud Computing is a new technology in IT world that makes ubiquitous access to number of resources available over the net. Cloud computing offers resource sharing method at lower cost and higher availability around the world. The cloud computing sometimes referred to as next stage in the evolution of the Internet. The cloud computing offers numerous services to the customers ranges from computing power to computing infrastructure, applications, business process to personal collaboration and can be delivered as a service wherever and whenever the requirement is there. The cloud computing offers the elasticity feature that makes the main reason for individual, business and IT users move to cloud. The term elasticity means that the users can request the additional resources on demand and just as easily release those resources when the resources are no longer required.

The cloud itself is a set of hardware, networks, storage, services and interfaces that delivered computing as service. The cloud services include the delivery of software, infrastructure and storage over the Internet based on the demand of the user.

II.   FEATURES OF CLOUD COMPUTING

Cloud computing offers lots of features to the users that becoming the reason for movement of large number of people towards the cloud computing. This section entitles some of the useful features offered by cloud computing.
  a.   Agility: The cloud computing helps in rapid and inexpensive re-provision of resources whenever requirement occurred by the user.
  b.   Ubiquitous: Cloud computing is ubiquitous in nature that offers the cloud services at anytime and anywhere around the world.
  c.   Multi-Tenancy: The resources offered by cloud servers can be shared and accessed by large number of users simultaneously. User does not require to purchase its own resources, instead they can use the resources on pay-per-use basis.
  d.   Reliability: Cloud computing offers the dependability of the resources and computing.

e. Scalability: Cloud computing offers the dynamic provisioning of resources helps in avoiding various bottlenecks scenario.

f. Maintenance: The maintenance of the pool of resources is the responsibility of the cloud service provider. Users have less work in the terms of resources upgrade and management.

III. REVIEW OF LITERATURE

Beri et.al.[1,2], in their study, discussed about the concept of cloud computing. Authors describes the components included in cloud computing environment and the various types of services offered by cloud service providers. Katyal[3], discussed the concept of virtualization. The author described the concept of load balancing and techniques used to balance workload between different virtual machines at the run time. Moreover, the author discussed the concept of load balancing is divided in two parts such as resource provisioning and resource scheduling.

Nitika et.al. [5,6], discussed about the various load balance scheduling algorithms to share resources according to different clients. The authors discussed the algorithms like, round robin, throttled, or active monitoring and compares the performances of these three algorthms.

IV. CLOUD MODELS

Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction.

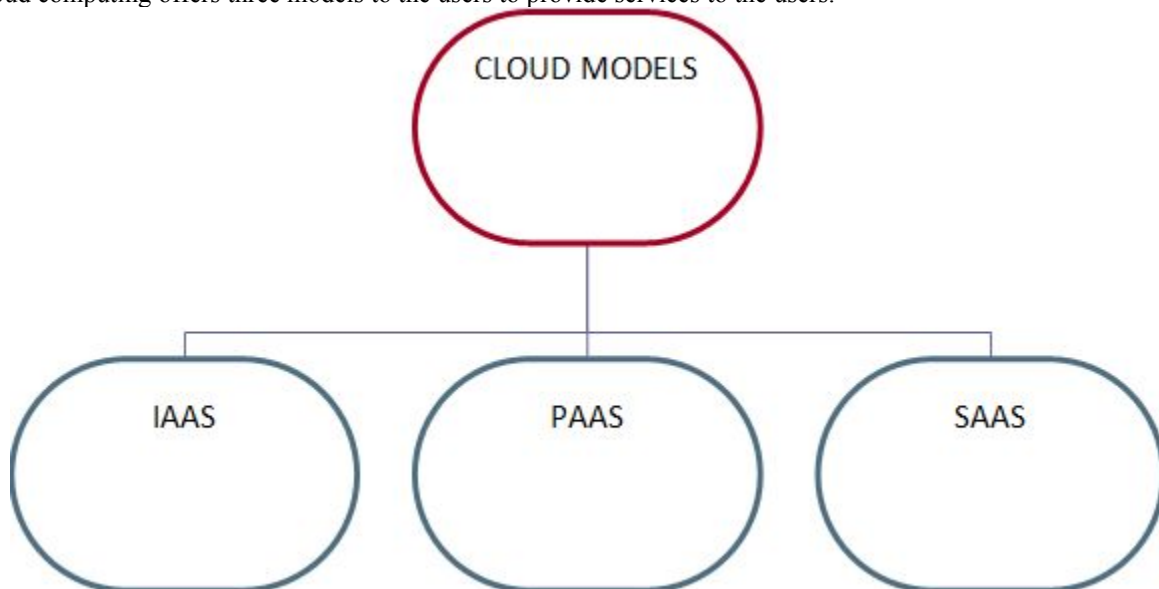Cloud computing offers three models to the users to provide services to the users.

Figure 1: Cloud Models

1. IaaS(Infrastructure-as-a-Service): IaaS provides on-demand hardware services offered pay-per-use basis. IaaS is a self-service model for accessing, monitoring and managing remote datacenters. It offers services like infrastructure, virtual machines, load balancers, firewalls etc. IaaS services include Amazon Web Services, Cisco Metapod, Microsoft Azure, Google Compute Engine etc.

2. PaaS (Platform-as-a-Service): PaaS offers platform services on pay-per-use basis. The platform services include, database, operating systems, or platforms required to development of the software etc. PaaS services include, Eric Knipp, Richard Watson, Apprendaetc.
3. SaaS(Software-as-a-Service): SaaS offers the application software on demand basis. SaaS allows user to access to the shared pool of software without buying the complete license of the software. SaaS services include, Google App, Salesforce, Workday, Cisco WebEx etc.

V. VIRTUALIZATION AND ITS TYPES

Virtualization refers to the process of creating an environment on a server to run multiple instances of the resources, so that number of users can have access to the shared pool of resources simultaneously. The virtualization may include the single instance or the multiple instance of combination of resources like operating system, network, application servers, computing environments, storage devices etc. Virtualization offers several benefits like, resources managed efficiently, maximization of server capabilities and reducing maintenance and operation cost.

The concept of virtualization is very broad field. It is categorized into 6 major categories. Every category of virtualization represents a broad field and scope in research area. This section entitles virtualization concept.

Figure2: Types of Virtualization

a. Network Virtualization: Network Virtualization is applied onto the network for maximum bandwidth utilization. The available bandwidth of the network is splitted into numerous channels for sharing the network resources to different users at the same time. Network virtualizations can be used to create logical switches, load balancers, workload security etc.
b. Storage Virtualization: Storage virtualization is created for using the pool of hardware storage into a single simulated storage which can be managed from one single server on command basis. Storage virtualization can be used for smooth operation of the system, consistent performance etc.
c. Server Virtualization: Sever virtualization is used for creation of server resources virtually. It simulates the behavior of actual severs and create number of resources virtually for sharing between users.
d. Data Virtualization: Data virtualization is implemented to abstract the details of data management irrespective to its location, performance, or format in which data stored.
e. Desktop Virtualization: Desktop virtualization is the mostly type of virtualization in which user access the workstation remotely and can share the workload to different workstations.
f. Application Virtualization: Application virtualization abstracts the application layer, separating it from the operating system. In this manner, user can access to the application resources over the cloud on pay per use basis.

VI. LOAD BALANCING
The previous section discussed different categories of virtualization. The scope of this paper is to the concept of load balancing. Load balancing is the process applied for network virtualization. Load balancing is the process in which workload and computing resources are distributed in computing environment. In other context, load balancing is a process in which the workloads of different servers are shifted to some severs to fulfill the scaling demand of the runtime process.

Load Balancing algorithms
Load balancing must consider this task, one is the resource allocation and other task is scheduling distributed environment [4]. Resourcing allocation is the process of provision of resources on demand basis. While allocation of resources the server needs to allocate resources in such a manner such that no node is overloaded and no wastage of resource would happen.

Task Scheduling process defines the method in on the basis of which the resources will be allocated to the client. It may include the space shared method or time shared method[4]. Numerous algorithms available for load balancing, this study main three algorithms related to load balancing.

a) Round Robin: Round robin scheduling technique is used in static environment. Round robin scheduling technique is a traditional technique in which the resources are allocated in time shared manner to each client. The time sharing between different client is done on the basis of first cum first serve, which means the resources are allocated to first client make request for a particular time period. After the expiration of that time slice the resource is allocated to other client in waiting in queue.

b) Throttled Scheduling: In throttled algorithm, the load balancers create an index table that includes the availability status of each virtual machine. Whenever, a client make request for particular machine, load balancers checks the index table from starting till end until the suitable virtual machine that can serve the request, not found. When load balancer found the suitable virtual machine, it allocates the machine to client and changes its status from idle to busy. When the client completes its work and releases the virtual machine, load balancer set its status from busy to idle.

c) Active Monitoring: In active monitoring scheduling algorithm the load balancer creates an index table also load allotted to the virtual machine. Whenever, the new request arrives, the load balancer searches for the index of the virtual machine that has lesser load and allocate first available virtual machine to the request.

VII. CONCLUSION

In nutshell we can say that the cloud computing is a revolutionized technology that offers numerous service over the internet on pay per use basis. The cloud computing offers various benefits to the organization or individuals as user can access the data from anywhere in the world and the burden to maintain the resources is reduced at the user level. The cloud computing technology provides different services to the user according to the requirement. The cloud computing offers the services to the user virtually. The virtualization is the concept in which the resources are shared among different users according to certain criteria. This study focused on the most important concept in cloud computing i.e. load balancing. Load balancing is the technique to share the pool of resources to the number of user in such a manner so that no wastage of resource will be there and resources will be utilized at greater extent.

The future aspects of this research is to compare the algorithms written in this study using some simulation environment.

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