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A Study on Resource Scheduling Techniques in Cloud Computing Environment

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ABSTRACT:
Cloud computing is a novel distributed computing technology that enables a pay and use model based on user demand and requirements. The cloud is made up of a network of virtual machines that can perform both computation and storage. The primary goal is to provide efficient and cost-effective access to geographically dispersed and remote resources. In recent years, cloud computing has grown in popularity among academics, government agencies, and businesses. Cloud computing makes use of a variety of virtualization technologies to provide computing resources to consumers as a utility service. Because cloud computing employs virtualized resources, scheduling and resource allocation are important research areas. To take advantage of the cloud's capabilities, efficient scheduling policies that reduce execution costs while increasing resource utilization are required. The costs of data transmission and execution are skyrocketing in today's computing environment and where the huge amount of data that needs to be processed is growing day by day. As a result, proper scheduling of tasks and resources is required to aid in the management of the rising costs of data-intensive applications. It can be difficult to schedule resources in a cloud environment. From the perspective of the user, quality of service (QoS) is the most important parameter for resource scheduling, whereas profit is critical from the perspective of the cloud provider. Under certain market conditions, the revenue is controlled by the cloud service platform. Customers are perplexed when it comes to storing their data in the cloud due to the disparity in pricing schemes among cloud providers. To reduce resource waste, many recent studies have focused on establishing a communication link between the server-side system and user experience for better overall resource management.

Keywords:- Cloud Computing, Resource Scheduling, Cloud Workload, Cost-Effective.

I. INTRODUCTION:-

Cloud computing is a novel and appealing approach to meeting the ever-increasing needs of businesses and organizations in this rapidly expanding information-technology market [1][2]. Nowadays cloud computing helps significantly reduce the cost of acquiring hardware and deployment of software applications, as well as the cost of maintenance.

Users are not bothered by inaccurate service scale forecasting, which results in resource waste [3][4]. Cloud computing resources can be shared by cloud consumers thanks to virtualization. Virtualization allows for the secure coexistence of multiple remote running environments on physical servers, allowing for the most efficient use of physical resources and energy [3]. Cloud computing is accessible from anywhere. Anyone who opens any magazines, websites, radios, or television channels will undoubtedly come across the term "cloud." The cloud hosts today's well-known social networks, e-mails, document distribution, and online games. In 2012, the US government intends to make cloud computing the default option for federal agencies [5]. Cloud computing as a service has increased the appeal of software and changed the way IT hardware is purchased. Changes in how businesses supply or use information will have an impact on information and computing. The rise of cloud computing has elevated computation to the status of next-generation platforms. Perhaps, cloud computing will be the primary platform for saving the world, allowing people to do anything they want on the internet.[6] The primary benefits of cloud

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computing are the collection of information on user needs and the services provided by technology. The internet coined the term "Cloud," but it is unclear how the cloud manages the crisscross structure of computer's and serves as an inspiration for complex frameworks.[7] Cloud computing is a method of computing that allows customers to access technology-enabled services via the Internet without prior knowledge or organization of the transportation of the tools that supports them. The first and one of the most popular cloud services nowadays is an email client. [8][9]

1.1 Cloud-based Service Model:-

The service models are divided into the following categories:

- **Software as a Service Model:** This model allows users to access on-demand applications from any location. As a result, the cloud provider grants the user a subscription-based license.
- **Platform as a Service Model:** The cloud offers a platform for application development, deployment, and management, removing the need for infrastructure maintenance.
- **Infrastructure as a Service Model:** A service provider makes virtualized resources available over the internet. Utilizing these resources, the user can deploy any software.[10]

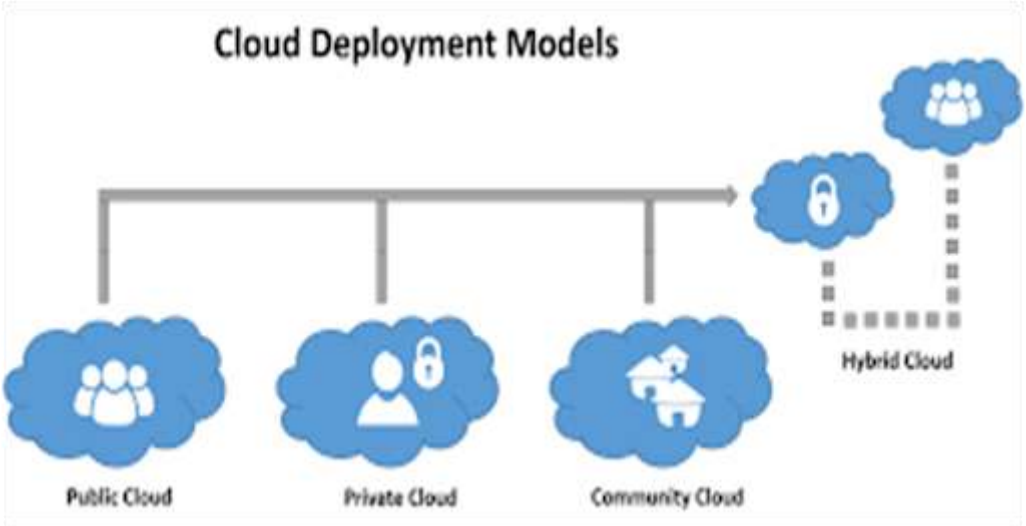

Fig 1. Cloud Deployment Model

1.2 Model of the Cloud System:-

This model's three entities are customers, service providers, and infrastructure service providers. It is common to use a three-tiered structure.

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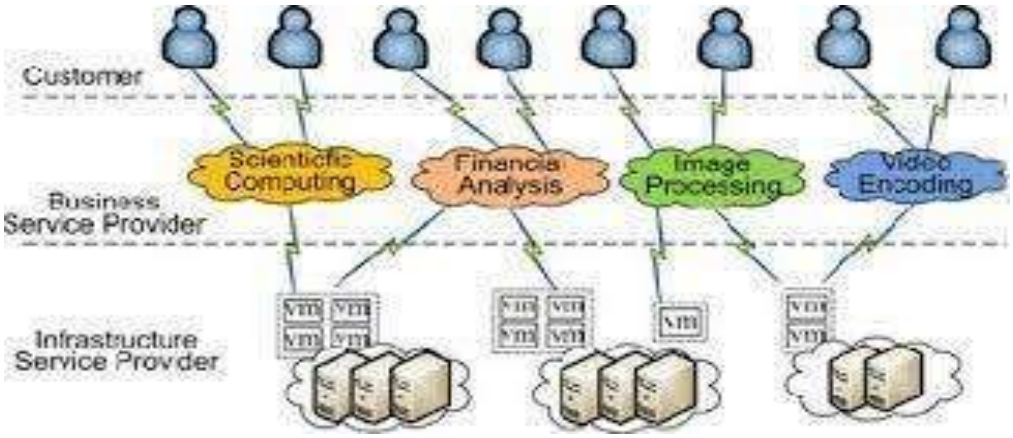

Fig 2.Structure of cloud

Infrastructure service providers provide the necessary software and hardware. As part of a service set, a service provider obtains resources from infrastructure service providers and configures virtual machines. The provider of on-demand services is in charge of doing so. The service provider is paid by the customer for the services provided. Regardless of the cost, the service provider compensates infrastructure providers for the use of their physical resources. Customers are also charged for handling service requests, which generates revenue. Profit is defined as the difference between costs and revenues. [10]

1.3 Model for Multiple Servers:-

As job resources, the cloud offers virtual machines (VMs).

As shown in the figure, the cloud consumer submits tasks to a service task queue, which is then arranged in a task queuing system. A job scheduler, in this case, functions similarly to a multi-server system, centrally scheduling all jobs and then allocating them to various VMs. As a result, a job scheduler also functions as a specialized workload manager. It effectively manages job queues, prioritization schemes, scheduling, monitoring, and resource management. A cloud service provider in this structure processes customer service requests using a multi-server model.[10]

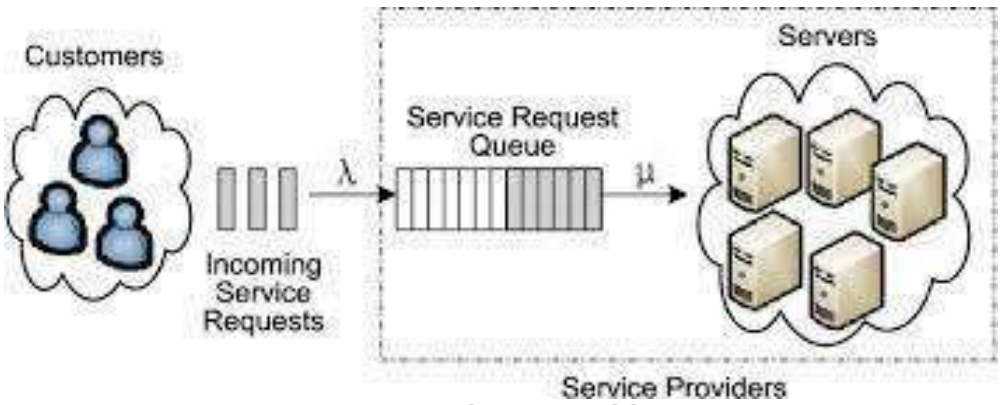

Fig 3. Multi-server model

1.4 Problems with Clouds:-

Cloud computing has recently exploded in popularity and established itself as a commercial reality in the field of information technology. The technology, however, is still in its early stages. Some issues must still be resolved.

Task Scheduling

Resource Management

Both Grid and cloud computing face significant challenges in task scheduling and resource provision. In the IT industry, cloud computing is a new technology. The cost-benefit of

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these computing paradigms is influenced by how service providers schedule cloud services for consumers.

1.5 Resource Scheduling:-

Resource scheduling is a difficult task in the cloud due to physical resource diversion, shifting load, disparate user needs, and disparate pricing strategies. [11] The mapping and execution of workloads based on specific resources via resource provisioning are referred to as "resource scheduling." [12] A significant amount of research has already been conducted on cloud resource scheduling. This paper provides an overview of resource scheduling in the context of cloud computing. [13] A cloud environment consists of two parties: the cloud consumer and the cloud provider. Workloads are submitted to the cloud by the cloud consumer, and the cloud provider provides resources for the workloads to be executed. Both parties have distinct goals: the provider wants to maximize profit with the least amount of investment and resource utilization, whereas the consumer wants to execute workload(s) with the least amount of cost and execution time.[14] Unpredictable resources are also considered by providers when scheduling and executing workloads. Because users and providers are both unwilling to share information with one another, scheduling resources becomes more difficult. Traditional RSAs do not address resource dispersion, uncertainty, or heterogeneity in the cloud environment, which adds to the difficulties of resource scheduling. [15][16]
As a result, it is necessary to execute cloud workloads efficiently while taking these cloud environment properties into account.

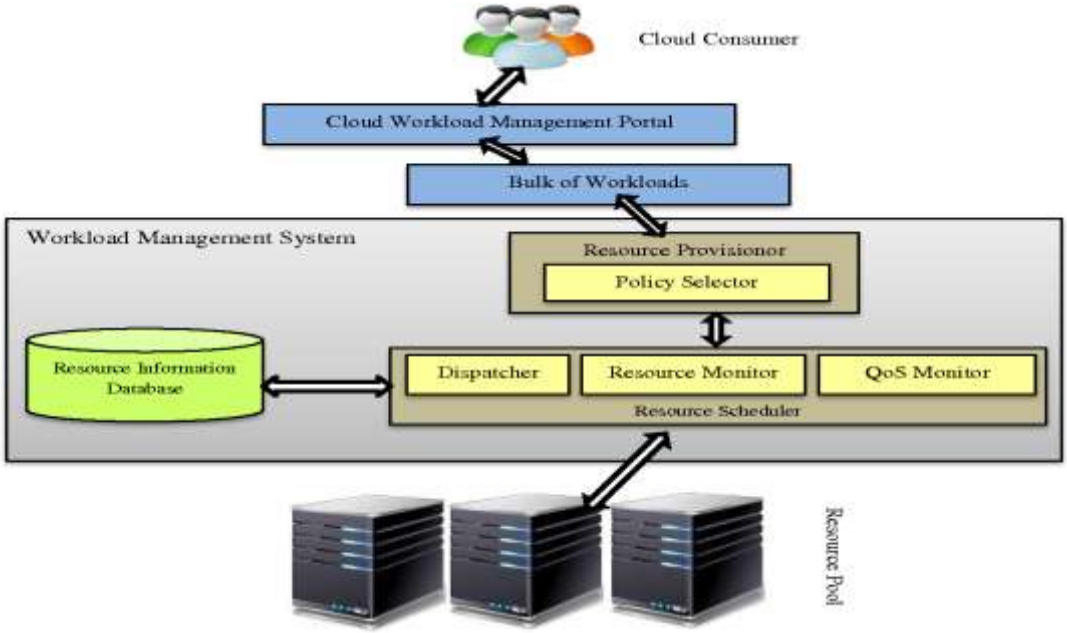

Fig 4. Resource Scheduling in Cloud

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1.6 Benefits of Cloud Resources Scheduling:-

- Improve cloud resource scheduling by shortening the execution and computation times for cloud workloads.
- Increased resource utilization in response to changing priority requirements, while avoiding resource under and over-utilization.
- Because of efficient resource allocation, there will be no scheduling delays and fewer chances of resource failure.
- Reduce the number of user deadline violations caused by resource scheduling after resource provisioning.
- Reduce the waiting time of workloads on queue through effective cloud resource scheduling.

II. LITERATURE REVIEW:-

2.1.Luo et al., (2012)[17] author have presented a cloud computing algorithm They allocate the resource in this proposed solution based on an energy optimization scheme or based on resource pre-allocation. Here they attempted to meet the QoS by allocating resources ahead of time to the VM. The proposed methods limitation is that resources are pre-allocated in a static manner, so it doesn't know how much time or resources will be required from the current Physical Machine.

2.2.Zhong et al., (2010)[18], Uses an Improved Genetic Algorithm instead of a genetic algorithm. They guarantee that this policy outperforms the traditional genetic algorithm policy. They discovered that IGA is twice as fast as TGA while working on the improved genetic algorithm. This, however, does not account for the method's limitation of maximum usage or utilization rate.

2.3.Chen et al., (2015)[19], have proposed a method for monitoring and forecasting the current state of cloud culture They attempted to predict and monitor the current status by using vector autoregression based on resource correlation. The proposed model outperforms, but they conclude that the time complexity for resource prediction is greater than what they can consume.

2.4.Han et a., (2013)[20], The Least Language First MinMin algorithm, based on the existing min min algorithm, has been proposed. Which of the tasks has the fewest number of sites and is chosen first to be executed, or a list of tasks has been created. This poor load balancing structure and less QoS factors are some of its limitations.

2.5.Xiaoming Nan et al.(2013)[21], There are two pricing schemes for resources: the Resource Reservation Scheme and the On-Demand Scheme, Reservation Scheme have a lower cost for the users. As a result, based on the price schemes presented, the authors attempt to minimize costs by selecting the best type and number of resources. In addition, the author proposes an Optimal Analytical solution to reduce response time. Due to the NP-Hardness of the Resource Cost Minimization problem, a greedy algorithm with a nearly optimal solution is proposed.

2.6.Fei Tao et al.(2016)[22], It was suggested that the problem of active virtual machine transmigration be addressed. Under the conditions, the proposed dynamic migration of VM's accounts for vitality intake, communication of virtual machine's, and transmigration costs.

2.7.Xuezhi Zeng et al.(2016)[23], It was suggested to use a greedy scheduling algorithm (MASA). The method collaborates with the user to reduce the cost of renting resources while keeping the user's budget and deadline constraints in mind. When compared to other existing methods, the result shows significant cost savings.

2.8.Lei Jiao et al.(2016)[24], Author investigated the price optimization problem in the context of dynamic OSN(Online Social Network) over sequential time intervals, They are in charge of the cost of OSN, the quality of its services, and the availability of data.

2.9.Yongyi Ran et al.(2017)[25], The author was able to reduce total computing costs while maintaining QoS by dynamically increasing the number of purchased instances. The author proposed a scheme for dynamic instance provisioning based on QoS mapping, This helps to calculate the upcoming demands with minimum instances.

2.10.Xuezhi Zeng et al.(2016)[26], It was suggested to use a greedy scheduling algorithm (MASA). The method collaborates with the user to reduce the cost of renting resources while keeping the user's budget and deadline constraints in mind. When compared to other existing methods, the result shows significant cost savings.

III. CONCLUSION:-

Cloud computing is becoming a more important area of Research and Development. The cloud provides users with access to utility services. Users must pay for service access based on how much they use the service and the level of service quality required. Scheduling is an essential task in the cloud computing environment.

From the perspective of a cloud expert, it is critical to reduce costs and maximize profits, whereas, from the perspective of a user, performance and throughput should be high while keeping the cloud provider's lowest pricing strategy in mind. In this review work, we studied some cost-

effective research papers on resource scheduling. An in-depth examination of the cloud and its workload can aid in cost management and resource allocation.

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