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A Study on Different Services of Cloud Computing Environment

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Abstract: ***In the present era, everyone wants their data to be stored, managed & processed in a faster & secure manner efficiently. But, just storing the data in one personal computer is not enough & secure, What if the person is far away geographically from the system then how can he access? & if the data is in bulk amount? , It won't be feasible. So, the solution to all such problems is "Cloud Computing". Cloud Computing is a term which defines the style of computing which takes place over the internet. The "computing" refers to all the data as well as software & hardware handling of the application over the cloud which includes managing & storing data, providing different application, infrastructure level services to the users. Using cloud storage for the business purpose can be boon to the organisation as in Cloud Computing. The data is stored in the cloud storage & hence provides different benefits & services to the users. But, to avail efficient services to the users "Job scheduling" is a must. This paper presents all about what is cloud computing?, along with type of clouds, its advantages, the services it provides and scheduling algorithm which are being used for enhancing the cloud services.***
Keywords— Cloud Computing, IaaS, PaaS, SaaS, Scheduling, FCFS, RR, PSA, SJF.

I. INTRODUCTION

In Cloud Computing, "cloud" refers to the "Internet", or one can say a "Network" whereas "Computing" refers to handling, accessing, processing of the data, software & cloud based resources. Therefore, Cloud computing as a whole is a computing platform, which helps to manipulate, configure & access the resources which is dynamically stable & virtualized are provided as a service over the internet or virtual private network.

Cloud Computing provides services to the user on "Pay-per-use" scheme, which means that the user or the business organisation can use the cloud services or storage space only according to their need & they have to pay only for the particular storage space & services they have opt for. The cloud enables to use remote infrastructure & plethora of services economically which focuses more on core competencies of the business.

According to NIST:- "Cloud computing is a model for engaging profitable, on-interest framework access to a typical pool of configurable enlisting resources (e.g., systems, servers, stockpiling, applications, and administrations that can be immediately provisioned and released with immaterial organization effort or organization supplier correspondence".[2]

The data can be prone to various natural calamities or accidents which can result in data loss which can harm the business organization in large scale, so to avoid it the "Virtualization Technology" is there, which provides the cloud enabled recovery system which keeps the duplicate copy of each data stored in the cloud at various different locations.

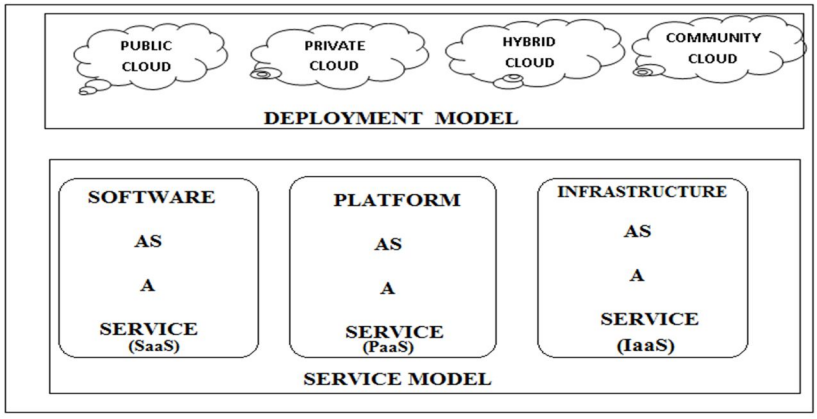

Figure.1 Cloud Environment

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The cloud environments are categorized into different services it provides, types of clouds in which services it deploys which is depicted in Figure.1. [10]. The services are divided based on Application, Platform & Infrastructure .So, the different types of clouds, its advantage & services are discussed further.

II. TYPES OF CLOUDS: DEPLOYMENT MODEL

As per the need of the user, keeping their needs in considerations the cloud computing services are framed in different four models or types of cloud, they are:

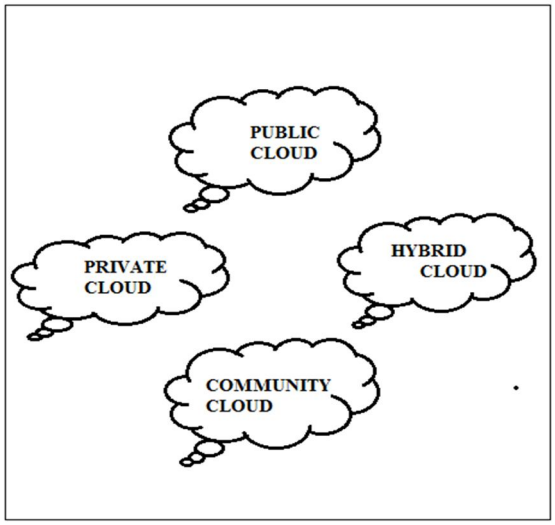

Figure.2.Types of Cloud

Figure.2 shows the types of clouds which are use to deploy different types of services as requested by the user. The brief explanation of four models is as follows:

A. Private Cloud

Private Cloud is the cloud which is reserved or owned by a particular organization only. It offers security as it can be only managed by the authorized third party or the organization itself. [8]

B. Public Cloud

It is the type of cloud which is open to all type of users' i.e. public can access the system & services. In this services are provided & managed by third parties.[6]

C. Hybrid Cloud

Hybrid cloud is the combination of both public & private cloud. It utilizes both of them one by one if needed, the private cloud for critical task & non-critical for public cloud .[9]

D. Community Cloud

The several business organisations in a joint venture share & construct cloud infrastructure for the business profit. [7]

Based on the type of resource handled by the cloud environment the service of the it is divided into three service model**.** The resource can be application, server, network, services & software.

III. CLOUD SERVICES

The Cloud Computing is based on the reference model known as "Service Model". The cloud contains three different types of services. They are as follows:

There is different service provider for each type of Services. In the fig. the different types of service is being shown along with their service providers' example:

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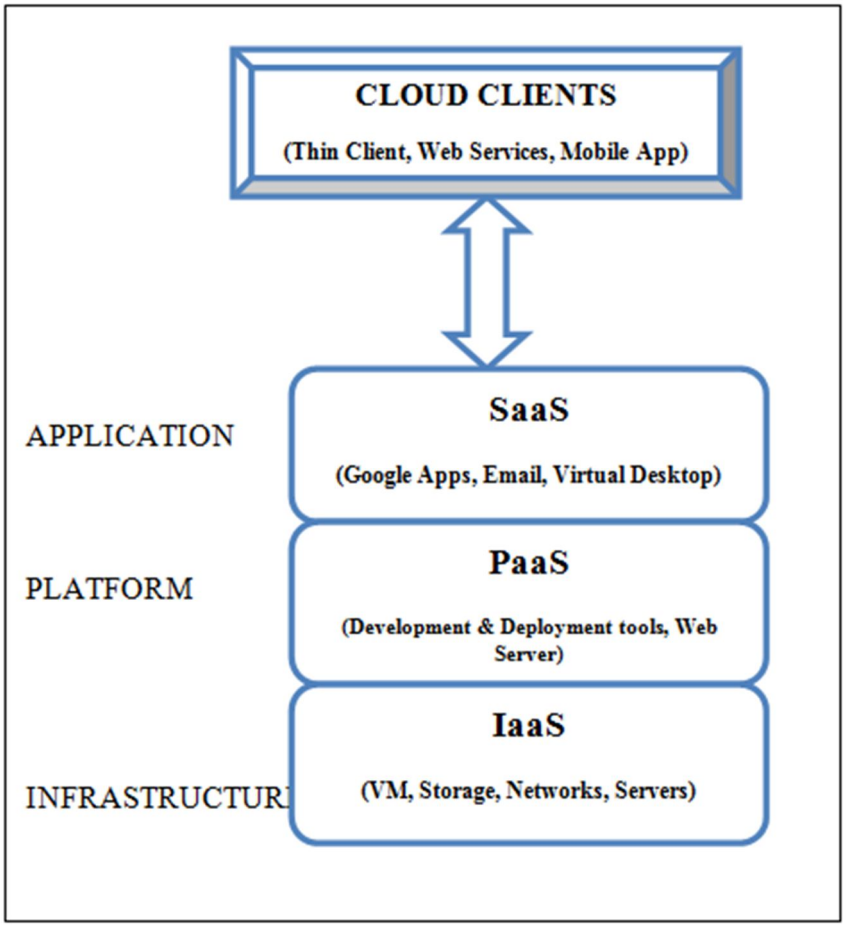

Figure.3.Cloud Services

The brief explanations of each Service are as follows:

A. Infrastructure as a Service (IaaS)

IaaS is the base of the service structure of the cloud computing services. It enables sharing of hardware resources for executing services. IaaS uses the "Virtualization Technology". It gives access to different resources such as virtual machine, physical machine etc.

The infrastructure forms of services are provided which deploy services on demand. [5] The IaaS also offers load balancing, VM disk storage and much more. It enables the user to access resources as an administrative access to the virtual machine. It helps to create platform for the services & the application development, integration & deployment. Its main advantage is its interoperability & portability with the legacy application.

Resources are available for clients on rent. As the client is provided with admin access he has got the feature of running any software & even operating system too. System manager is the one who uses IaaS. Some of the IaaS service providers are Amazon AWS, GoGrid, and Rackspace. [2]

B. Platform as a Service (PaaS)

It is the middle level of service in the cloud service model. It provides software run time environment such as "Application Server". It helps in developing the application along with the deployment & developments tools. Because of the feature of development & deployment tool it helps the user or non-developer to develop the application with ease. Developers & deployers fall under this service.

The PaaS is offered by "Google's App Engine", "Oracle Public Cloud" etc.Such vendors contain "built- in-tools", with just "point & click" method ,the website can be created.[7] .But there is lack of portability as if you create a website using Google engine,

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website can be used only in Google engines environment ,this is called as vendor "lock-in " system.
But it provides greater scalability, as it can be scaled up or down accordingly to the demand of resources required in application. It also provides web service interface that will help in connecting application with different platform too.

C. Software as a Service (SaaS)

Software as a Service approach offers different application to be used by the client or the end-user as a service. [3] The application can be used by the user on his PC but is managed by the vendor rather than in which it is being executed. The SaaS avails the application over the internet, which can be downloaded & used by the end-user over a fixed subscription period.
"Office Suite" is best example of the SaaS service provider but it cannot be customized. For developing a customized application SaaS provides us Application Programming Interface(API).The best part of the SaaS application are that it does not cost any maintenance expense on the user. It also provides automatic update to the applications which includes functions as backup, security, hardware updating, and system & power management, all by the cloud service provider.
It offers scalable data model. It is the modest software tool as there is no need to install software for the application at the user end and is of low distribution cost. It is based on software license, which results in authenticated use of software or application. Some of the SaaS providers are "Google Apps", "salesforce.com", "MS office suite" etc
But, for the services to be carried out efficiently & delivered to the end-user or the client in the time there is a need of Resource Management & Task Scheduling. So, that the task & resource should be managed together & hence processed with time along maintaining QoS,for which "Scheduling " is needed.

IV. SCHEDULING ALGORITHM

The main aim of Scheduling is that task should be allocated to the selected resource effectively i.e.) task allocation .For increasing the efficiency of whole cloud computing system the task scheduling problem should be overcome which can be done by managing jobs i.e. "Job Scheduling". Job Scheduling helps in handling both the users' tasks to the efficient selection of resources & its execution.
There are different Job Scheduling Algorithms which fulfils the scheduling needs like maintaining QoS, increasing throughput, Load Balancing etc.Like some of them are explained one by one as follows:

A. FCFS

It is the "First Come First Serve" scheduling Algorithm. It is the simplest of the entire job scheduling algorithm. It works on the "FIFO" manner [11]. The task which enters first will be served first without any preferences. But it results in long queue, the task entering later have to go through long waiting queue & hence is time consuming.

B. SJF

It is the "Shortest Job First" scheduling algorithm. In this algorithm the task which has got smallest execution time will be queued & executed first in the queue. It selects the job with shortest execution time. The task which has the longest execution time will be processed last in the queue. It utilizes resources very less & has long waiting time.

C. PSA

It is the "Priority Scheduling Algorithm". From the name itself it is clear that this scheduling is based upon the priority of the task. The task with the highest priority will be scheduled first & lower priority at last. It is of two types :

1) *Static Priority Scheduling Algorithm*
2) *Dynamic Priority Scheduling Algorithm.*

D. RR: It is the "Round Robin scheduling algorithm" which is based on "First –In-First-Out" (FIFO), just the difference is that it is time dependent scheduling algorithm. The queue is in circular form. The task is allotted with particular slice of time. The biggest advantage of this algorithm is the well utilization of resources in balanced manner.

So above mentioned algorithm are the existing algorithm whose merit & demerit has been given & based upon it, comparison of different scheduling algorithms is given in Figure.4

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Algorithm-m	Difficulty Level	Allocation	Waiting-g Time
FCFS	Simplest algorithm of all	Allocated in the order in high processes are arrived.	More
SJF	Code Difficult to understand	Least burst time process gets allocation	Less than FCFS
PSA	Code Difficult to understand	Processes with higher priority can run first	Lesser
RR	Time dependent Performance	After a fixed interval of time preemption takes place	More than rest

Figure.4 Comparison of Scheduling Algorithm

From the above comparison we can decide that which algorithm will be suitable for scheduling depending on the different types of jobs.

V. ADVANTAGES & CHARACTERISTICS OF CLOUD COMPUTING

There are various advantages & mainly five characteristics of cloud computing, they are as follows:

A. *Characteristics*

1) *On-Demand self-service:* The user can use the cloud services & resources on their own just by logging on to the services provided by the cloud on their own demand.
2) *Resource Pooling***:** It means that various number of user can share pool or ample of resources at the same instant. It is carried out using a multitenant model.
3) *Broad Network Access:* Broad Network access means that we can access the cloud services from anywhere at any time. It should be accessible through any device not limited to only one device.
4) *Rapid Elasticity:* Rapid elasticity means that the resource is scalable, it can be customized accordingly. The resources can be monitored automatically.
5) *Measured Service***:** In the measured Services the resource used can be tracked & controlled. The Deployment model is the example of measured service along with Service model.[4]

B. *Benefits*

1) *Reduced Cost:* As because of the scheme “Pay-per-Use” the cost is reduced for using a cloud service as only you have to pay for what service you are in need with.
2) *Development & Deployment tools:* With the feature of inbuilt development & deployment tools online, it has made easier for the developers as well as non-developers to develop the application.
3) *Reliability:* As it offers the feature of Load Balancing it provides reliability i.e. it is reliable in nature.[1]
4) *No Software Required:* As the software is being installed in the server side only client does not have to install any software in that way the software is not needed.[4]
5) *Limited Hardware Required:* As the software is not required to install in each end user system the hardware needed is only for the fast internet speed not for installing big softwares.
6) *Application as service:* Application can be used over the cloud or the internet as a utility. Cloud Applications can be accessed anytime over the internet.

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VI. CONCLUSION & FURTHER UTILITY SCOPE

In this paper, we have gone through the study of "Cloud Computing Environment" & its various services, benefits & characteristics. In all we conclude that it's a fortunate thing to all the end user to use services over the cloud which is flexible & reliable. But we have also gone through the phase that for effective cloud services provided to the user it is also needed to schedule the tasks to the resources so that the cloud services can be efficiently used by the client. Many scheduling algorithms have also been used to increase the competence of cloud. In future we can enhance existing job scheduling algorithm further to increase the throughput & efficiency of the cloud services & hence making this evolutionary notion to be used in the IT field with ease.

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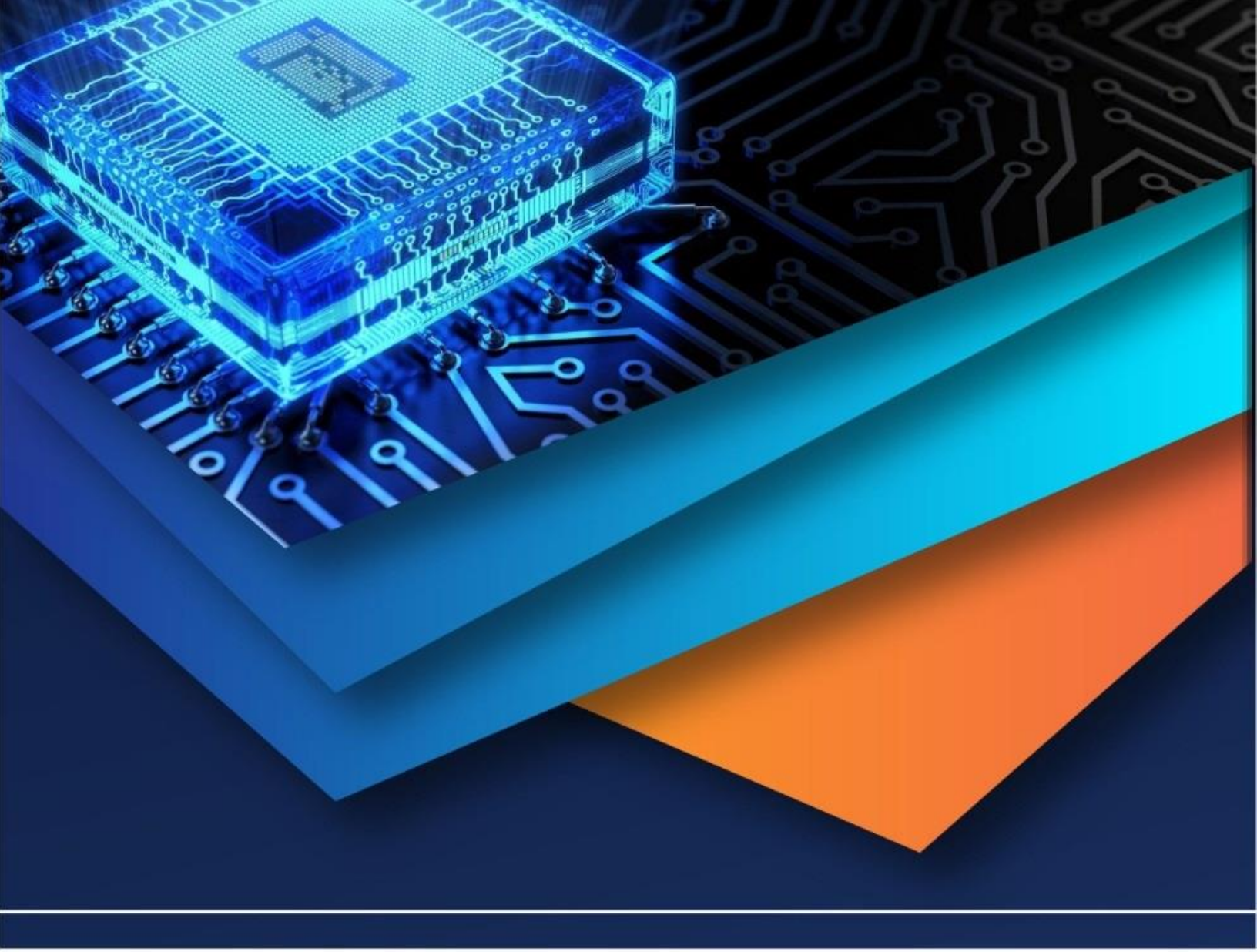

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