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A COMPREHENSIVE STUDY OF CLOUDANALYST TOOL AND ITS VARIOUS ALGORITHMS

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ABSTRACT
In today's era the main concern of technocrats is to find out the efficient storage space for users. So that they can store any kind or any size of data their without spending lots of money on storage devices. The birth of 'cloud' technology is just like boon for users. Anywhere and anytime usage of cloud services are quite beneficial for their users. Various cloud services like SAAS, PAAS, IAAS, DBAAS are taken on rent by the users for their own usage. CloudAnalyst tool based on cloudsim is used for storing data on different data centers. It also worked as a load balancer for datacenters so that load can be equally spread on every datacenters. This survey paper focused on various algorithms which are used for spreading load equally on datacenters so that no datacenter is suffering from the problem of overloading. The comparative performance analysis of such algorithms is also taken into account.

INTRODUCTION
Clouds are basically defined as the storage in the computers that are networked anywhere in the world. Its usage attracts the users most because it provides the various facilities and **anywhere, anytime access** of cloud is also a good feature it means that it has ubiquitous network access. On the other hand it also provides the facility of **on demand self services** it means that whenever user demand for the resources, they can get it. **Pay-per-usage** is also one of the facilities of cloud means you have to pay only for those resources which you have taken on rent. **Location independent resource pooling[1]** means there is no need to be system specific for the storage of data on cloud.

SERVICES OF CLOUD

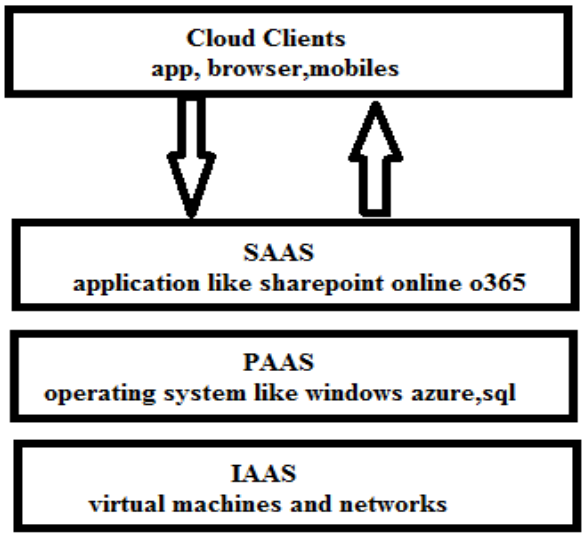

Fig.1 Various cloud services

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Various services provided by cloud are:

1. Saas- 'software as a service', helped users to take advantage of software and also it eliminates the need to install and run software on their own system. Various vendors provide software on rent by using middleware ,o/s, virtualization,server,storage and networking. 'Google apps' is one of the examples of Saas services.
2. Paas- 'platform as a service' helped users to take various platforms on rent, it's quite advantageous for quick deployment of application simple and cost effective also there is no need to buy layers of hardware and software. Basically internet browser will be used for developing the applications (Google chrome, Mozilla Firefox). 'Force.com' is an example of Paas services
3. Iaas- 'infrastructure as a service', to minimize the cost of buying infrastructure. Its good to take network information on rental basis. Users take advantage as infrastructure on top which they can install any required platforms. Amazon ec2, rack space, windows azure, Google compute engine are example of Iaas services.
4. Staas- 'storage as a service' [2] provides facility for user take servers on rent. To physically buy servers is quite expensive task its good to take servers on rent and pay only for certain time we used them. 'Amazon s3' is an example of Staas.
5. Dbaas- 'database as a service' helped the users to give databases on demand for the users so that it can be accessed via the internet from the cloud database service provider. 'oracle exadata ' is the example of Dbaas services.

DEPLOYMENT MODEL OF CLOUD

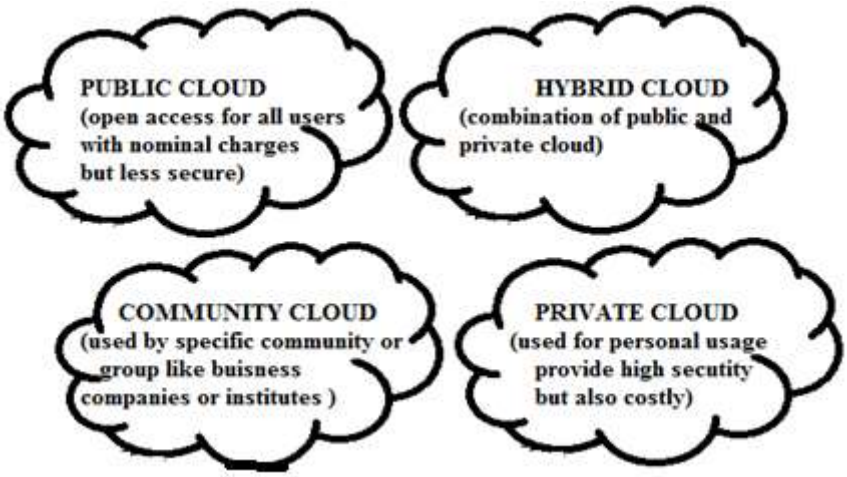

Fig.2 Cloud models

Public cloud: In Public cloud the computing infrastructure is hosted by the cloud vendor at the premises [4]. The customer has no visibility and control over where the computing infrastructure is hosted. The computing infrastructure is shared between any organizations.

Private cloud: The computing infrastructure is dedicated to a particular organization and not shared with other organizations. Some experts consider that private clouds are not real examples of cloud computing. Private clouds [5] are more expensive and more secure when compared to public clouds. Private clouds are of two types: On-premise private clouds and externally hosted private clouds. Externally hosted private clouds are also exclusively used by one organization, but are hosted by a third party specializing in cloud infrastructure. Externally hosted private clouds are cheaper than On-premise private clouds.

Hybrid cloud Organizations may host critical applications on private clouds and applications with relatively less security concerns on the public cloud. The usage of both private and public clouds together is called hybrid cloud. A related term is Cloud Bursting. In Cloud bursting organization use their own computing infrastructure for normal usage, but access the cloud using services like Salesforce cloud computing for high/peak load requirements. This ensures that a sudden increase in computing requirement is handled gracefully.

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Community cloud: involves sharing of computing infrastructure in between organizations of the same community. For example all Government organizations within the state of California may share computing infrastructure on the cloud to manage data related to citizens residing in California.

CLOUDSIM & CLOUDANALYST

Clouds make deployment of several applications easier and cheaper, but it also creates some problematic issues for developers. Cloud infrastructures are widely spreaded , applications are deployed in different geographic areas, and the performance of application degrades if data centers are far away from the location .Internet applications are worldwide because its popularity varies along its usage, experience in the use of application by users will also vary. Quantifying impact of number of geographic location of relevant components, simultaneous multiple users, and network in applications is hard to achieve in real scenario, its main reason is the presence of things that neither be predicted nor be controlled by developers. Therefore, other methods that allow usage of quantification with such parameters must be used. To allow facilities of control and repeatability of experiments, simulators like CloudSim are used. Simulation experiments apply models for achieving both goals applications and infrastructures [7]. So, application developers must focused to model both the target infrastructure and the software in such a language that can be interpreted by the simulator. Simulators offer support to model such scenarios, but still modeling of specific scenarios may be time demanding. One of the main goal of CloudAnalyst tool is to separate the simulation experimentation task from a programming task, so a program modeler can focus on the simulation complexities without wasting much time on the technicalities of programming using a simulation toolkit. The CloudAnalyst tool also enables a program modeler to execute simulations repeatedly and to conduct a series of simulation experiments with slight changes in parameters very quickly and in easy manner.

The main features of CloudAnalyst are as follows:-

- Ability to perform a simulation with a high degree of flexibility and configurability. Simulation of complex systems like Internet applications depends on several parameters. Typically, values for those parameters need to be arbitrarily assumed or determined through a process of error and trial.
- Easy to use Graphical User Interface (GUI). CloudAnalyst tool is equipped with an easy to use GUI that enables users to perform experiments quickly and easily.
- CloudAnalyst tool support modelers by providing a high degree of control over the experiments, by modeling configuration and entities options such as,
- Hardware configuration of Data Centers is defined in terms of physical machines consist of storage devices , processors, memory and internal bandwidth;
- Data Center [10] having virtual machine specification in terms of memory, storage and bandwidth reservation; Resource allocation methods for Data Centers.
- Internet techniques are there with configuration options for network delays and available bandwidth;
- Service Broker Policies are used to control segment of total user base which is serviced by a Data Center at a given time;
- Simulation duration may vary in minutes, hours or days.
- Repeatability of experiments option is there for users.

CloudAnalyst allows modelers to save simulated experiments, input parameters of data and results in the form of XML files so the experiments can be repeatedly performed. The CloudSim simulation framework ensures that repeated experiments always give identical results.

GRAPHICAL OUTPUT

CloudAnalyst tool is helpful for generating graphical output of the simulated results in the form of tables and charts, which is useful to effectively summarize the large amount of data that is collected during the simulation. Such an effective presentation of data in the form of table and chart helps in identifying the important patterns of the output parameters and find out the comparisons between related parameters. In the current version of CloudAnalyst tool , the statistical metrics are produced as output of the simulation is as follows:

- Response time can be calculated of the simulated application.
- Calculation of overall average time, minimum and maximum response time of all user requests can be simulated. Response time can be rearranged according to user groups, located within the geographical regions.

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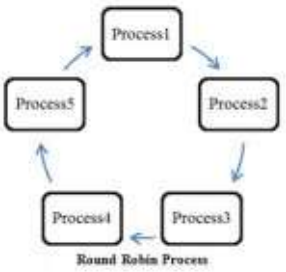
- Showing the pattern chart of changes in application usage during the whole day.
- Usage patterns of the application can be simulated.
- Number of users arranged by time or regions of the world according to usage of data by them, and the overall effect of that usage on the data centers hosting the application on different servers.
- Total time taken by data centers to service a user request; overall request processing time for the entire simulation session.
- Average, minimum and maximum time required for processing by each data center; response time varies according to the load pattern changes during the day.
- Details of costs of the simulation operation.

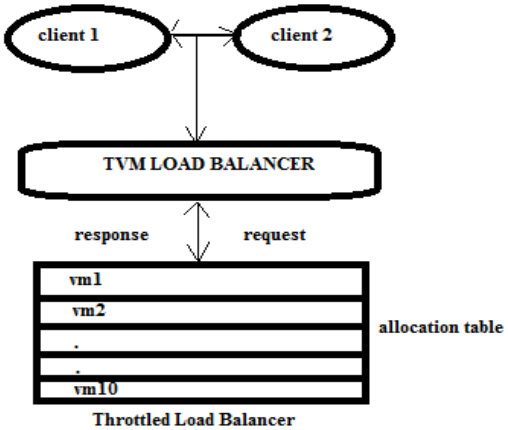
Use of advanced technology and ease of simulation extension. CloudAnalyst tool is based on a modular design that can be easily extended. It is the combination of following technologies: Java (the simulator is developed on Java platform); CloudSim (CloudSim features for modeling data centers is used in CloudAnalyst); and SimJava [6] (some features of this tool are used directly in CloudAnalyst).

VARIOUS LOAD BALANCING ALGORITHM

1. ROUND ROBIN LOAD BALANCER- Simplest scheduling technique [14] that utilizes the principle of time slices from total processor time. In this total time slice is divided into small multiple times slices and the resources are allocated to the processors for a particular time slice (like 1ns) then after the completion of that particular time slice next process is arrived and the same time slice is allocated to that process. In the same manner the time slice will be allocated to the processes and every process get the resource in circular fashion.



2. TROTTELED LOAD BALANCER- This algorithm ensures that particular numbers of resources are allocated to a single virtual machine at any particular given time. If there are further request arrived than the number of available virtual machine at data centre allocate to incoming request in queue basis until the next VM becomes available. .



3. **ESCE (EQUALLY SPREAD CURRENT EXECUTION)** – In this the jobs are submitted by the clients to the system. When jobs arrive to the system they are queued in the stack. Then system estimates the job size and

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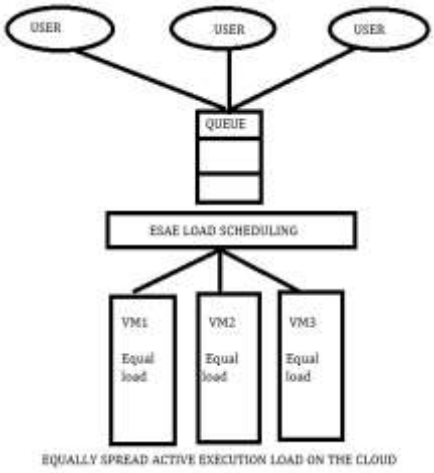
checks weather any resource is there or not and also checks the capacity of the virtual machine. Once the job size and the available virtual machine size match, the job scheduler immediately allocates the identified VM to the job in queue. The impact of the ESCE algorithm is that there is a decrease in response time and the processing time. The jobs are equally divided, the complete system is load balanced and no virtual machines are underutilized.



PERFORMANCE ANALYSIS OF ALGORITHMS

As the performance of all these algorithms are analyzed following results came out.

A. RESULT FROM ROUND ROBIN ALGORITHM

In the above diagram DC refers to the datacenter and UB refers to the user base. Different colors show the various regions around the world map. The performance analysis is based on the response time by the user within 3 criteria's average response time, maximum response time[13], minimum response time.

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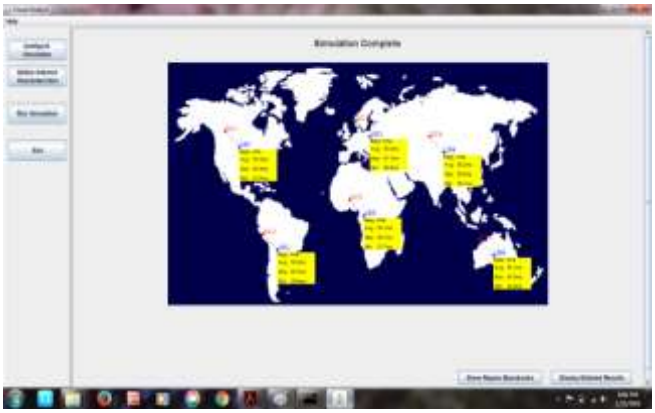
B. RESULT FROM THROTTELED ALGORITHM

In the above diagram DC refers to the datacenter and UB refers to the user base. The performance analysis is based on the response time by the user within 3 criteria's average response time, maximum response time, and minimum response time. At DC3 the average response time of the user is less as comparison to round robin algorithm.

C. RESULT FROM ESCE ALGORITHM



In the above diagram DC[15] refers to the datacenter and UB refers to the user base. The performance analysis is based on the response time by the user within 3 criteria's average response time, maximum response time, minimum response time .At DC3 the average response time of the user is less as comparison to round robin algorithm.

CONCLUSION

This survey paper basically enlightened some points on the basics of cloud and its services with some pros and cons. The detailed study of cloud analyst simulator and its functionalities are also discussed here. Next there are some algorithms and there comparative study so that we can analyze the performance of each. After the result analysis performance of throttled algorithm and ESCE[12] algorithm gives better result as comparison to the round robin algorithm.

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