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PERFORMANCE ANALYSIS OF PaaS CLOUD COMPUTING SYSTEM

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Abstract: Cloud computing is business infrastructure paradigm that promising to remove the need for organizations to keep up an exclusive computing hardware. Cloud computing provides to users with various capabilities to store and process the data in third-party data centers. Cloud computing maximizes the effectiveness of shared resources. During the use of time sharing and virtualization cloud address with the particular set of material resources in a large scaled user's base with different needs. In this paper computing the performance of Platform-as-a-Service (PaaS) model and integrating the mechanisms to capture the virtual machine migrations. We study the cloud services on different large applications. In this paper we are presenting the performance of Platform-as-a-Service (PaaS) by using systematic model to perform end-to-end analysis of a cloud service. The systematic model designed by using scheduling algorithm i.e., Adaptive First Come First Serve under different job sizes. The performance is analyzed by using performance metrics such as consumption, availability, response time, waiting time. The cloud performance metrics depends upon the behavior of the cloud data center.

Keywords: Virtualization, Platform-as-a-Service (PaaS), Adaptive First Come First Serve.

1. INTRODUCTION

The cloud computing is a condition of information technology communications throughout the internet. I.e. the provision of mutual resources, services, software and application in excess of the internet to convene the flexible insist of the client with bare lowest amount exertion or communication with the service providers.

1.1 Types of cloud computing services

1.1.1 SaaS

Software as a service (SaaS) provides application to the users by means of a cloud communications or policy, relatively than provided that cloud features themselves i.e., application, software or correspondences are intended for clients deliver over the web. SaaS is not essential for the customers to have a substantial replica of the S/W installed on a personal computers, laptops or whichever other client devices. SaaS can be treated it as application or service cloud. Frequently, this can be a type of usual applications S/W methodology presented in cloud.

Ex: Google maps, Google search, Sales force CRM.

1.1.2 PaaS

Platform as a service (PaaS) is the combination of services and tools intended to create code and deployment of application in excess of the web rapid and proficient for the customers. The customers doesn't have access to the fundamental cloud communications together through system, servers, OS, or storage space, but has manage above the deploy tool/service and possibly arrangement settings for the application launching environments. It can be provide a group of developer's surroundings though a client can utilize to construct their application having not any hint concerning what is going away on under the services. PaaS is a platform anywhere application can be residential, experienced and use.

Ex: Google Drive, Microsoft windows XP, Java.

1.1.3 IaaS

Infrastructure as a service (IaaS) is the substantial layers that are created by the H/W resources which are required to hold the cloud services organism provide, and characteristically include server, storage, OS and system mechanism. Thus it can be hardware and software that power the cloud. Here the client doesn't have access to the fundamental cloud communications but has control in excess of OS, storage space, and deploy applications and possibly restricted manage in excess of selected network mechanism.

Ex: Amazon, Microsoft windows azure SQL.

1.2 Cloud Usage Models (Cloud Deployment model)

Cloud computing is also can be categorized into 4 main groups depends on procedure or exploitation: Private cloud, Public cloud, Community cloud and Hybrid cloud.

1.2.1 Personal (Private) Clouds

Personal (Private) Clouds are characteristically own or lease by the particular association or individuals. It might be manage and operate by the association or a group of them, and it might exist off or on property.

Ex: Flip kart

1.2.2 Community (domain-specific) Clouds

The clouds are maintained for precise necessities by a group of organization. It is compute resource provide more the internet for constrained utilize by an exact community of users as of organization that have common attention. Frequently the user's are a grouping of community with a general environment or by means of mutual concern surrounded by the community or the public. Community clouds are a go between among public and private clouds. It might be manage and operate by 1 or more organizations in the exact community or various combinations of them and it might be present off or on property.

1.2.3 Public (General) Clouds

The clouds provides services to the more number of the populate. It is the mainly recognizable and fashionable form of cloud. Here in the general cloud, computing resources are animatedly arranged over the internet. They survive on the premise of the cloud providers. It might be own, manage, and operate by businesses, academics or public organizations or some combination of them.

Ex: Google apps, Windows Azure, Amazon.

1.2.4 Hybrid (Mixed) Clouds

A mixed cloud is essentially a arrangement of two or more clouds. It is a combination of public and private cloud infrastructure meant at achieve ultimate cost diminution all the way through outsourcing whereas maintain the preferred stage of organization. Based on ELC Technologies 2010,mixed cloud model are probable to materialize as the mainly general structure of cloud in the expectations as they make available subscribes better option and opportunity to access explicit services contained by the same cloud exclusive of the require to control to an completely dissimilar contributor, if business wants modify. Hybrid clouds characteristically also engage an elasticity which service is hosted in the clouds.

2. PROPOSED WORK

Platform-as-a-Service (PaaS) user segment and infrastructure management users will be different from each other and their interest would be on the business aspects. PaaS user segment covers the key SDLC cycles and the deployment management rather than the infrastructure level details. we are presenting the performance of Platform-as-a-Service (PaaS) by using systematic model to perform end-to-end analysis of a cloud service. The systematic model designed by using scheduling algorithm i.e., adaptive first come first serve under different job sizes. The cloud performance metrics depends upon the behavior of the cloud data center.

The following figure1 depicts that job requests are placed in the queue and the queue has a finite size F. If the queue reaches its maximum limit is reached extra requests are rejected. The system queue follows FCFS scheduling policy. If the resource is available then job is accepted and mapped to the corresponding Virtual Machine. Assume the instantiation time is omitted and the service time is exponentially distributed with its mean. The system considers virtual machine under two different conditions such as insufficiency and overload. In the overload condition waited jobs are placed in dispatcher virtual machine. Dispatcher virtual machine used in particular situations by the system and the public cloud systems offers the resources through a paying and sharing model. If the virtual machine is idle then there is no waiting job.

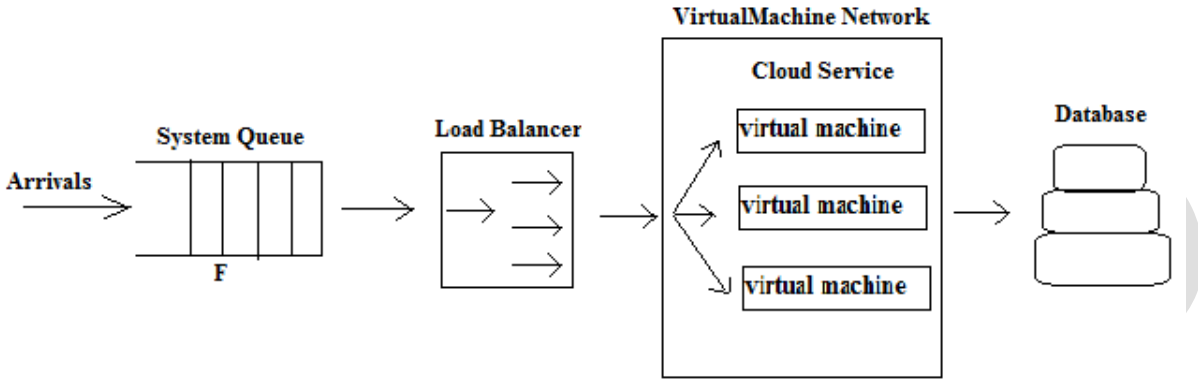

Figure 1: PaaS Performance Systematic Model

Algorithm:

Step 1: Arrival job requests are placed in queue in First Come First Serve manner

Step 2: If the Virtual Machine index is 0 then the Virtual Machines are in available state.

Step 3: If the virtual machines are available then Data center (DC) receives a new request.

Step 4: Data Center queries for next allocation.

Step 5: The Virtual Machines were parsed by Data Center Controller to get next available Virtual Machine

If (resource is available) {

// found

Returns the Virtual Machine id to Data Center Step2 continues}

Else { // resource is not available

Virtual Machine index initialized to zero. }

Step 6: When the Virtual Machine finishes the processing client request and the Data Center receives acknowledgement and it notices the load balancer of the Virtual Machine for de-allocation.

Step 7: The Load Balancer updates the status of Virtual Machine whether it is available or not.

Step 8: Continue from Step2.

3. STEADY STATE ANALYSIS

In steady state analysis the particular state of the proposed model is represented by using systematic model. System performance metrics are used to characterize the behavior of provider and user. Those metrics helps the system designer to manage the cloud data center. The performance of Platform-as-a-Service (PaaS) model is analyzed by using the metrics such as consumption, availability, service time, responsiveness.

3.1 Performance Metrics

3.1.1 CONSUMPTION OR UTILIZATION:

Utilization can be calculated by considering actual work and total hours. Actual work can be considered as number of resources utilized in steady state. The actual work can be indicated as 'Aw' and Total Hours can be indicated as 'T'. If the number of jobs will increase in queue the utilization of a data centre will be increased. The utilization factor can be computed as:

Utilization = Aw/ T (in hours).

3.1.2 AVAILABILITY:

If the system is able to accept a request then the system is available. Availability can be shown by using Boolean values 0 and 1.If the requested job is available the Virtual Machine index will be pointed to 1 otherwise it will be 0.

3.1.3 RESPONSE TIME:

It is the steady state probability within a given time deadline that the system is to accepting a request. Throughput indicates the number of transactions per second an application can handle, the amount of transactions produced over time during a test.

Response time (RT) is computed by service time (ST) and the wait time (WT). Service time (ST) is the time to do the work and waiting time (WT) is the time you waited for the turn to be serviced. Response time (RT) can be computed as:

$$R_T = W_T + S_T$$

$$W_T = N_{JS} / A_{JA}$$

W_T -Wait Time

N_{JS} - Average number of jobs in the system

A_{JA} - Average rate of jobs arrival

3.2 Performance Analysis:

The result will be analyzed by considering the number of jobs in queue and time needed to complete the jobs. If the arrival of jobs in queue increased then the response time of the system will be increased. If the jobs in queue will increase then the utilization of cloud datacenter will be increased as shown in figure 2. As shown in figure 3 when the congestion is increased the throughput increases linearly and finally reaches a throughput plateau. After this point as if the load is increased the throughput remains saturated at this level. The response time starts increasing non-linearly with increase in load and low at low traffic levels and continues to increase up to maximum of system resources like the memory and CPU. Throughput measures the amount of work performed by Application Server and defined as the

number of requests processed per minute per server instance. The response time is includes the factors such as bandwidth, number of users, number and type of requests submitted. If the load increases the response time for a request also increases

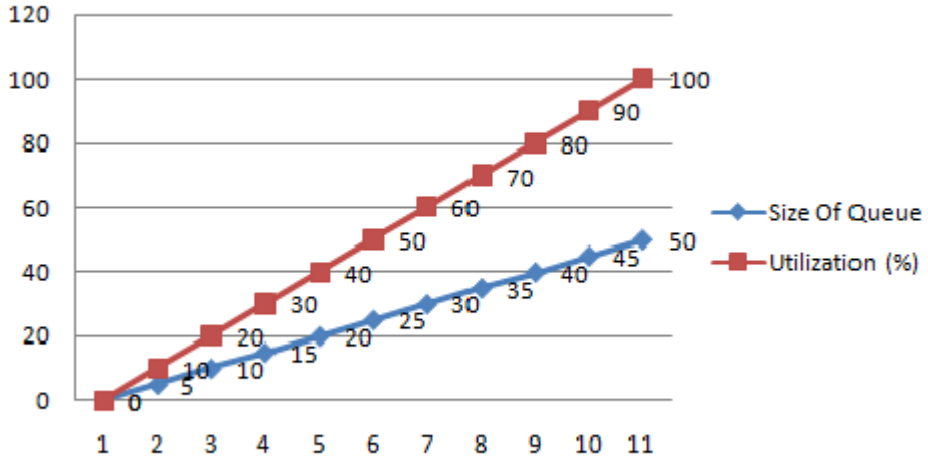

Figure 2: Size vs Utilization

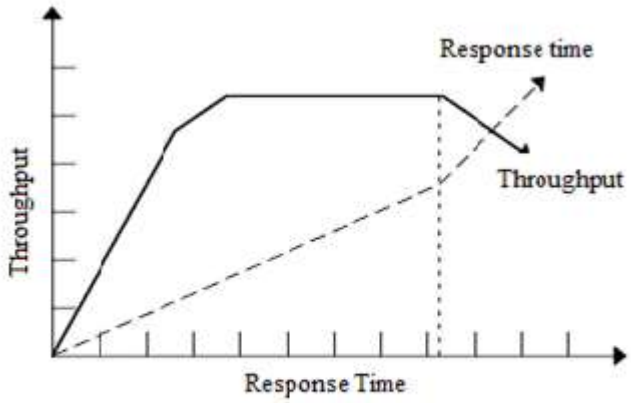

Figure 3:Throughput vs Response Time

4. CONCLUSION:

The cloud computing is internet based computing in which resources are provided to users based on Adaptive FCFS (First Come First Serve) manner. In this paper we have presented the performance of PaaS (platform-as-a-service) model by using performance metrics and integrating the mechanisms to capture the virtual machine migrations. Metrics are the important elements for evaluating the quality for enabling the identification of a good Cloud Computing. In this paper we have presented the data center utilization and response time at different workloads. The cloud performance metrics depends upon the behavior of the cloud data center.

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