International Journal of Engineering Research and Development
e-ISSN: 2278-067X, p-ISSN: 2278-800X, www.ijerd.com
Volume 10, Issue 2 (February 2014), PP. 16-21

Filling the consistency and reliability gap in elastic cloud – an IaaS approach

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Abstract:- The current Software, Platform and Infrastructure (SPI) architecture addresses the need for security. This can be achieved by solving the issues with scalability. The performance measures of the cloud are also addressed with the other two parameters like consistency and reliability. Few areas in cloud that need to be addressed towards scalability are dynamic scaling and virtual system for sharing the resources. To address this, the concept of elastic cloud is discussed in this paper with its performance measures using reliability and consistency. The discussed model reflects on Amazon elastic model and SESA approach and in addition to this the concept proposes virtualization along with optimized scaling.

Keywords:- IaaS, Cloud scalability, Consistency, Reliability, an IaaS approach

I. INTRODUCTION

The concept of scalable performance of the system used for building effective distributive system was discussed in the recent years. This concept evolves in cloud and defined by its scalable services. Scalability was adopted and handled in almost all the cloud architecture. Due to the dynamic nature of the cloud, the elasticity prevails and results in system virtualization.

The enormous growth of the system and its data set addressed by the concept of distributed system and while adoring it the upfront cost or the installation cost invested on it is maximum. To avoid such cost, the cloud infrastructure comes with the proposal by which the set up cost is zero. The lack of integrity is another issue arise in terms of distributed system especially when data is accessed any where beyond the boundary.

The IaaS approach in cloud focus on sharing infrastructure as a service by which the hardware or system resources are shared with in an organization. To measure the scalable issues of cloud infrastructure, only the desire need is accomplished by removing those services or resources which are not needed. The scalability of the cloud is also calculated based on time factor in minutes or seconds to quench the desired services. The optimum utilization of the cloud lies in sharing the resources, services in Just in Time (JIT).

In order to access any resource or service in cloud virtually, replication of the service prevails on different zone with the same request. This is a challenging aspect in elastic cloud and it needs to be addressed. Such accessing policy also leads to duplication of relevant data and services and occupy different storage location nevertheless multiplies data storage capacity.

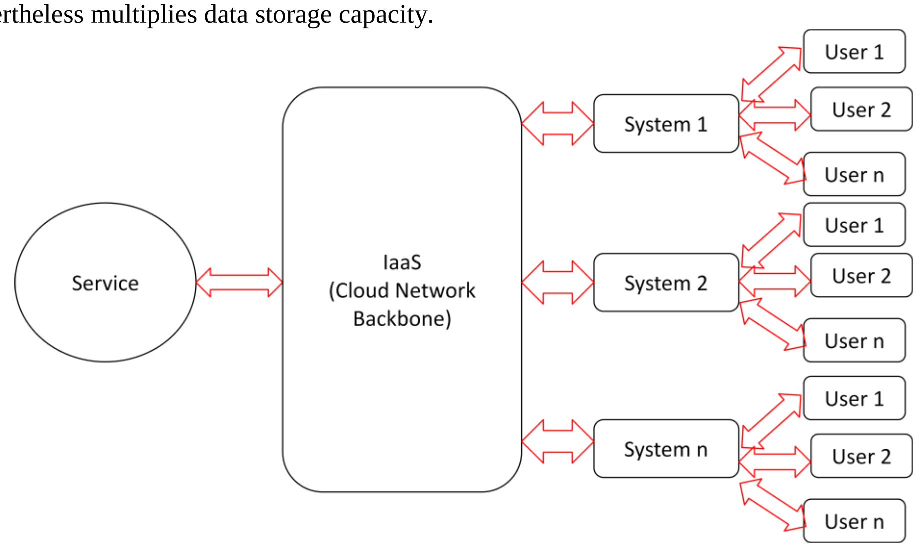

Fig 1: Cloud model in IaaS

The Fig 1 defines a cloud as IaaS [3] where different users of various kinds (private, public etc...)[4] were present in this scenario of approach. The security issue arises in the aspect of public cloud services especially the tolerance level increases when the service gets duplicated on different location. The scalability and consistency were measured in IaaS when all the system integrates into common phenomenon for accessing unique services. In this approach the scalability and consistency deployed in terms of the system not by the IaaS approach. The organization of this paper addresses the basic cloud IaaS model followed by literature review, continued by explaining the proposed model dealing with model tradeoff and finally conclusion and future work. Fig 1 projects basic cloud model for IaaS services.

II. EMPATHETIC CLOUD IAAS – A SURVEY

The concept of virtualization adhere is cloud IaaS basically uses virtual IP address of the system. Based on the customer role they can utilize the cloud services. This concept in parallel supported with other cloud services like SaaS and PaaS. When a requisition comes from a vital client, the designated virtual IP is assigned to make use of the services which is a part evaluated by IaaS approach, on the other hand the system used for accessing the service, served with the virtual IP and that provides unique services with the belief is that IP address is unique. The concept of SaaS [1] in IaaS [2] provides designated services via the virtual IP along with the components needed for accomplishing the task. The interface establish between the system and cloud server that does the role of identifying exact services assigned for the IP in other words the system that holds the virtual IP.

The PaaS in cloud services connects the services via a platform and that comes into role when the services and Infrastructure are well established with the interface. Basic operation of PaaS works with system tools with the percentage involvement of IaaS services into it as shown in Fig 2.

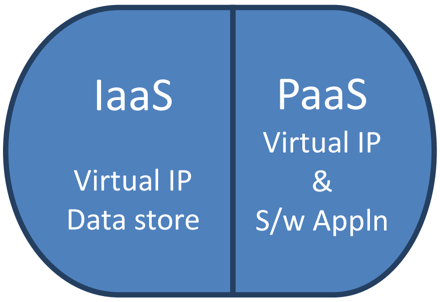

Fig 2: Cloud Services using IaaS and PaaS

Measuring the consistency and scalability of the system lies in the utilization of resources using IaaS services [8]. The resource utilization in terms uses both the IaaS and PaaS services for all the systems to adhere to the cloud services. Hence the betterment of the services lies in efficient usage of the system and its resources.

III. PROPOSED MODEL

The model identifies the core component for ensuring consistency within the system deployed to thecloud server. While addressing the consistency measure of cloud services, it is measured using utility computing. The scenario of utility resource computing in cloud services is explained in the Fig 3.The service requisition and grant was done by cloud using utility processing. The utility processing identifies the system's virtual id and if the system or the user is novel then the service is granted if not it will be revoked.

This process identifies the legitimate user and the system which has granted the virtual id. This process is basic in novelty, but the issue prevails in the form of system consistency while using the resources in a legitimate system.The core principle of cloud computing for providing effective services deals with the following

1. Resource utilization
2. System virtualization
3. Elasticity
4. Service providers
5. Service invocation

A. RESOURCE UTILIZATION

This feature uses the basic cloud services like SaaS, PaaS, and IaaS. Depending on the system or user request of availability, the services are either granted or accessed by the user.

B. SYSTEM VIRTUALIZATION

The systems were identified based on its location and the virtual IP assigned for accessing the cloud services. Such feature paves way for 'n' number of system accessing a same resource in an instance.The prolonging service allocated to a system, will be either terminated or the accessing in progress depends on the efficiency of the system. These concepts also address consistency and reliability for services to be made results in either success or unsuccessful mode of allocation.

C. ELASTICITY

It is a key concept addressed in this paper for dealing with consistent, reliable usage of services. When a new system request for a service to the cloud server, the cloud server allocates a virtual IP and provides the service. As the request grows on depending on the number of system accessing or requesting the services, all the system services were satisfied without affecting the performance of cloud server.

The effectiveness lies on the cloud server to make the services effective despite increasing the number of system for accessing the services. In contrast if the system is accessing a resource of varying size, then the complexity grows as this process is replicate on more number of systems.

In order to address this, the reliability measure is calculated for every system accessing a service from the cloud server.

$$(\boldsymbol{R_i})^{\boldsymbol{n}} = \sum_{\boldsymbol{i=0}}^{\boldsymbol{s}} \sum_{\boldsymbol{j=0}}^{\boldsymbol{r}} \boldsymbol{U}(\boldsymbol{i},\boldsymbol{j}) \qquad (1)$$

Where R is the reliability measure, i is the system identification, r is the resource access for each i of system s, and U is the utility calculate for an individual system.Using the eqn (1) the reliability is measure and the system is made available for accessing cloud services once the reliability is found perfect. For providing effective solution towards services accessibility the consistency measure is also taken for consideration.

$$(\boldsymbol{C_i})^{\boldsymbol{n}} = \sum_{\boldsymbol{i=0}}^{\boldsymbol{s}} \sum_{\boldsymbol{j=0}}^{\boldsymbol{r}} \boldsymbol{U}(\boldsymbol{i},\boldsymbol{j}) \qquad (2)$$

Now, the point is when is the system accessing cloud services is reliable and consistent, if it so then on what measures. The performance evaluations of system accessing the services were calculated by combining the reliable and consistent measure of the system during the process of service acquisition [9]. The time factor also plays a major role for measuring the consistency measures. When a resource is been deployed to a system, the system holds the resources until the access completes or based on few other factors that makes the services inaccessible.

The reason for inaccessibleness may be of any reason, but the point makes clear whether is the services are accessed or not. This key factor helps in measuring the reliability of the system accessing the resources. The consistency is measured by, whenever there is a demand in the services; the access is granted at any cost. These two factors are two different edges in cloud for accessing the services. The proposed work addresses these issues by combining reliability and consistency factors and that provides efficient cloud services when the service is extended beyond boundary (elastic cloud). The primary objective is to ensure reliable service even when the service is accessed uttermost to the boundary.

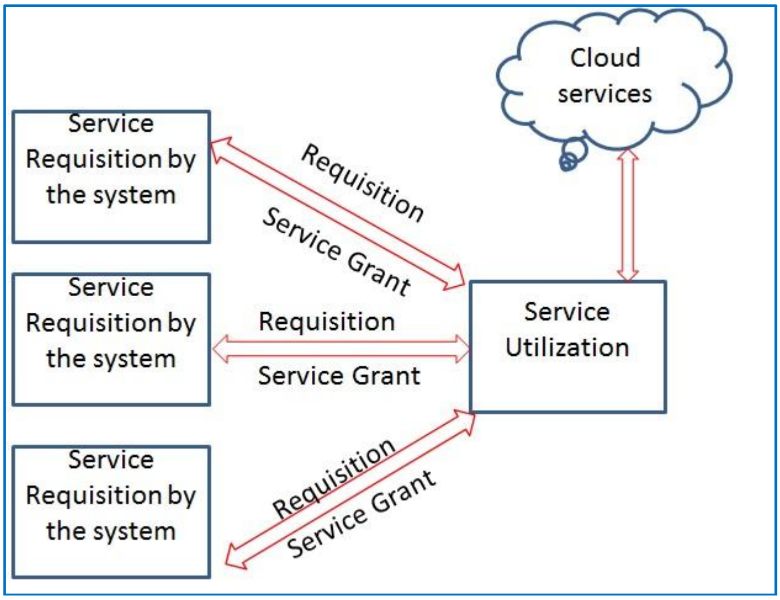

Fig 3: Utility cloud services

Fig 3 shows the cloud services deployed based on resource utilization. Here the boundary is fixed and the systems positions are dynamic. The grant and revoke permission of the resource access done by service utilization henceforth known to be utility server of the cloud. Irrespective of the system number the service is granted and resources are shared among system. In this concept, all the cloud services (SaaS, PaaS, and IaaS) adheres only the boundaries of the system location and provides the services within the boundary. The SaaS is no longer extended in this case.

Fig 4 shows the cloud service extension using elastic cloud concept. In this scenario, the cloud services were deployed beyond the service, for satisfying the system accessing the resources. The extension of SaaS is to access the services to the designated location; the PaaS allocates the platform or hardware with software application for performing accessing task within cloud services. The IaaS plays a vital role for deploying the hardware and software component for extending the cloud services to the newly extended location without affecting the cloud service performance by incorporating the result achieved in this work towards reliability and consistency.

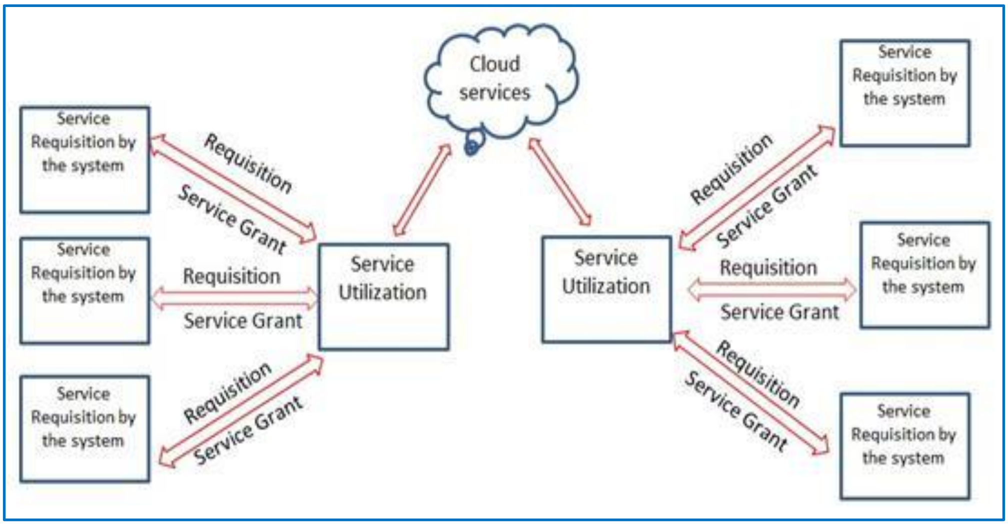

Fig 4: Elastic cloud services

When the cloud is deployed in elastic environment (Amazon EC2) it converts the Virtual IP into Elastic virtual IP. The Elastic IP map the static IP into private, public or hybrid [5] IP based zone access. Such classification will dictate the successful and unsuccessful service failure based on zonal classification.

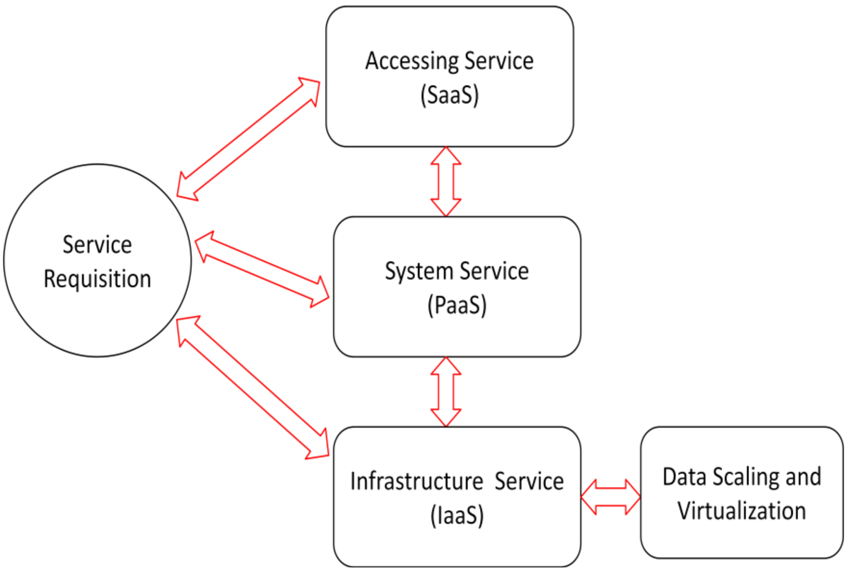

Fig 5: Cloud stack with Scaling virtualization

Fig 5 shows the proposed cloud [6] stack with data scaling and virtualization. The understanding is that all deployed virtual id possess the reliable and consistency measures in order to provide effective cloud services and migration services [7]. The score achieved in this work is deployed using Hyper-V which is a windows virtualization server.

IV. RESULTS

The simulation result shows the reliability and consistency calculation in terms of the number of systems and resources. The result projects the resource utilization and also measures the consistency of the system performance. The proposed work is implemented by maximizing the access rate (consistency) by gradually increasing the system and the resources to measure the utility rate. The achieved result projects positive growth in utility rate by balancing both reliability and consistency. Such combination will increase the scalable performance of the system as the number of system grows and the increase the utility demand. The focus lies in the combination factor and result in maximum access rate even when the number of system is increased.

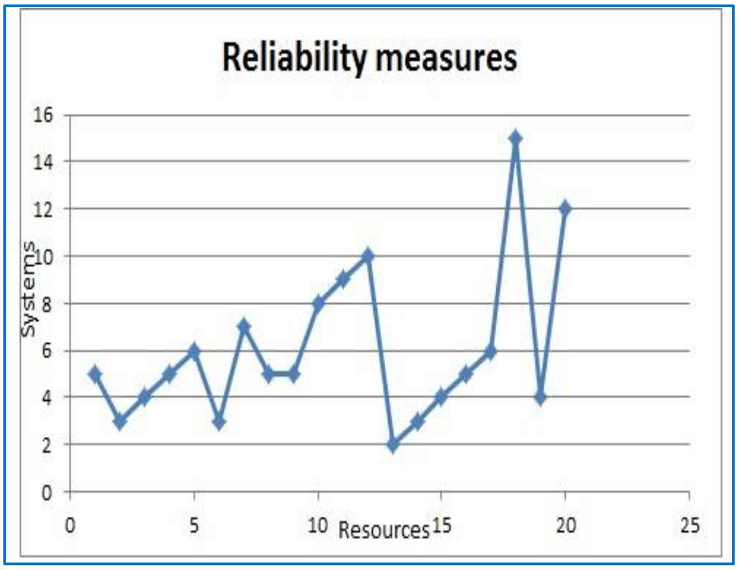

Fig 6: Utilization reliabaility measures

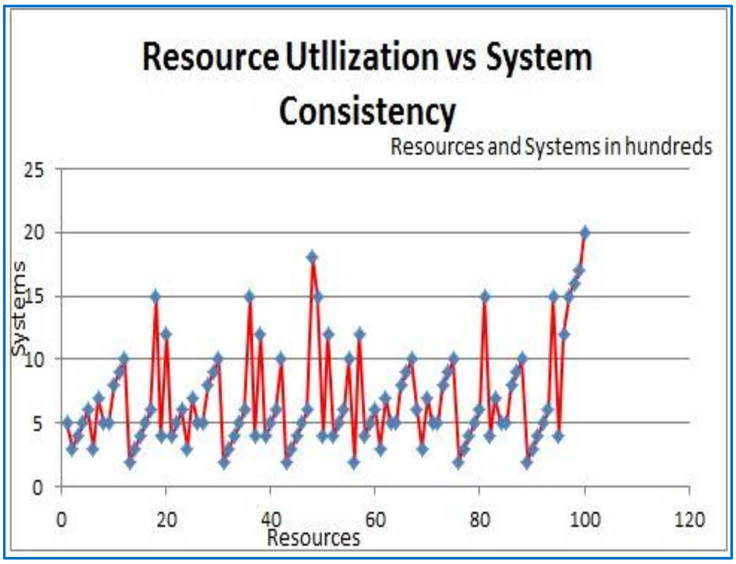

Fig 7: Resource utilization and consistency measures

V. CONCLUSION AND FUTURE WORKS

This works addresses the combination factor of reliability and consistency for providing scalable services. The result achieved shows the positive growth in reliable cloud services for accessing the resources. The consistent performance was also addressing that to in elastic cloud services. The virtualization factor was also addressed using virtual ip in elastic cloud. An extension of this work will address cloud watch with elastic cloud that helps is monitoring cloud services after deploying in either private or public cloud.

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