ISSUES OF MOBILITY IN CLOUD COMPUTING ARCHITECTURE: A REVIEW

Mrs. Snehal A.Narale[1], Dr. P.K.Butey[2]

[1]Assistant Professor & Head, [2]Associate Professor & Head,[1] Department of Computer Science, [2]Department of Computer Science , [1]Dharampeth M.P.Deo Memorial Science College, Nagpur, India,
, [2]Kamla Nehru College, Nagpur, India.

Abstract : Cloud computing is a technology which follows distributed computing approach in which resources and services are available under one umbrella in a single huge computational power/entity. Customers can access their applications from cloud data center from anywhere i.e. location independently. The resources are dynamically provided to the customers as pay on basis of their request over the internet or middleware. A cloud provider helps to transfer data from one data center to another. Usually cloud servers don't work at full ability means there's some power of processing data will be wasted. To use this wasted power in proper format it's possible to use the feature of mobility which can be able to move, migrate or relocate data, application software's among cloud data center server. In this paper author discussed, presented and suggested an architecture that can deal with the mobility feature with its issues in the cloud environment with respect to data migration. This paper makes a glance on the other issue of cloud architecture like energy consumption.

Keywords: Cloud Computing, Mobility, Data Migration and Techniques, Cloud architecture.

I. INTRODUCTION

Cloud computing is a model for facilitate network on demand from anywhere conveniently access to share pool of configurable computing resources like network, server, storage, applications and services [1]. Cloud computing technology has potential to enhance collaboration, agility, availability, scaling and provide many opportunities for cost reduction through different optimization and effective computing technology. Cloud Computing is the familiar catchphrase in today's Information Technology world. Cloud computing platforms are rapidly capable that were used for deploying different applications in many contexts [2]. The cloud is discriminating from the other traditional technology as it has infinite amount of capacity related to resources that are offered by cloud platforms with very competitive rate (e.g. CPU, storage, Network, infrastructure). With this advantage of resource capacity use of cloud computing help to eliminate the necessity for the installation of infrastructure requires for computing takes several months. Many of the Start-up Companies does not want to invest on the infrastructure because the resources are available in the cloud [3,4].

Cloud computing supports distributed computing approach so the resources are dynamically provided to the customers/consumers as per their requirement as pay on basis over the middleware or internet. A cloud provider provides services to the customers. It also helps to transfer or switch the data from one cloud to another cloud of data centre. While transferring the data between one cloud to another cloud, many challenges has to faced one of it is data migration issue and response time. In cloud data centres most of the servers has not work with full of its capacity means some time there is some power of processing of data would be wasted. To use this wasted power in proper format it's possible to use the feature of mobility which can be able to move, migrate or relocate data, application software's among cloud data center server. In this research paper author studied the issues of mobility in cloud architecture like data migration. Along with this data migration other issues of the architecture mainly energy consumption is discussed.

1. Cloud Computing System

The cloud computing system is build up with various components like service models (IaaS,PaaS and SaaS) and Delivery Models like (Public,Private,Hybrid and Community)[5]. Cloud computing systems provides all the resources at one place and satisfy the users request as per their requirement .Request from a user base need to be routed to a data center, where it can get serviced from different cloud like private to public or vice a versa. The process has been decided the efficiency with respect to response time, data center processing time and cost. Service broker policy plays an important role in achieving these parameters with efficient values [6]. Here are three service broker policies which are used in the proposed architecture to check the availability of the data center.

a. CDC
b. ORT
c. RDR with LB

Table 1: Comparative analysis of service model & deployment model [6]

Service model	Deployment model
IaaS: ➢ It offers virtualized computing resources. ➢ It offers different resources on demand on behalf of users ➢ It is multitasker. ➢ Pay on a per use basis.	Public cloud ➢ Scalability. ➢ Elasticity ➢ Accountability ➢ Low-cost, pay-as-you-go model ➢ Greatest efficiency in case of shared resources
PaaS: ➢ It allows for higher-level programming. ➢ It will help to reduced complexity. ➢ Easy to maintain &enhance application. . ➢ Multiple users work on single site with location independence..	Private cloud ➢ Greater control ➢ More security ➢ High performance ➢ Customizable ➢ Deeper compliance
SaaS: ➢ Ease in administration. ➢ Automatic updates and patch management. ➢ Compatibility. ➢ Global accessibility.	Hybrid Cloud ➢ Cost effective ➢ Increased flexibility ➢ Better security and control ➢ More scalability of resources.
	Community Cloud ➢ Cost of setting up a communal cloud is cheaper as compare to private cloud ➢ Management of the community cloud is easy. ➢ Results in time

II. PROBLEM STATEMENT

In cloud computing (distributing computing) data is stored at various places of data centre. User can access as well as share the resources from one cloud data centre to another cloud data centre with either on same or different cloud provider. While sending and receiving data from cloud data centre the mobility issue has been generated. Most of the time when user send request to access applications or resources from cloud data centre, cloud server cannot utilize its whole processing power. Due to wastage of processing power the issue of high energy/power consumption has been occurred. The role of cloud deployment model is most important while sending and receiving data from cloud data centre. During the whole process request send first to private cloud and then pubic. But both clouds have their own limitations. Public cloud has more accessibility and scalability but the limitation of data security which is more in private cloud when data has been transferred from one cloud to another. To overcome this problem in this research paper studies the mobility issue and the solution on this issue is hybrid cloud which gives optimized result with respect to data migrations solution to mobility.

III. HYBRID CLOUD ARCHITECTURE: A SOLUTION TO MOBILITY ISSUE

Hybrid cloud is defined as multiple cloud systems which comprise the characteristics of both private and public cloud which allows the application programs and data can be moved easily from one place to another with platform independently. Hybrid cloud is combination/integration of two deployment model like private

and public which combines the characteristics like security or privacy of private cloud and accessibility of public cloud to perform various functions within the same organization. A hybrid cloud offers services in two ways one is vendor has private cloud and partnership with public cloud and vice a versa for another case. In hybrid cloud, organization mange the resources in house and some out house [7,8]. There are basically two issues one is data migration and another is mobility in cloud. Fig 1 shows the basic hybrid cloud model.

1. Data Migration

- Process of transferring data between storage types or computer system [9,10]
- Data migration occurs for a variety of reasons:
  - Server or storage equipment replacements
  - Maintenance or upgrades
  - Application migration
  - Website consolidation
  - Data centre relocation

2. Mobility in Cloud Computing

- Mobility means it is the state of moving data from one place to another.
- In cloud computing mobility means transfer the data from one cloud to another cloud.
- In another way it is defined as cloud data migration which is one of the challenges of cloud computing[11]

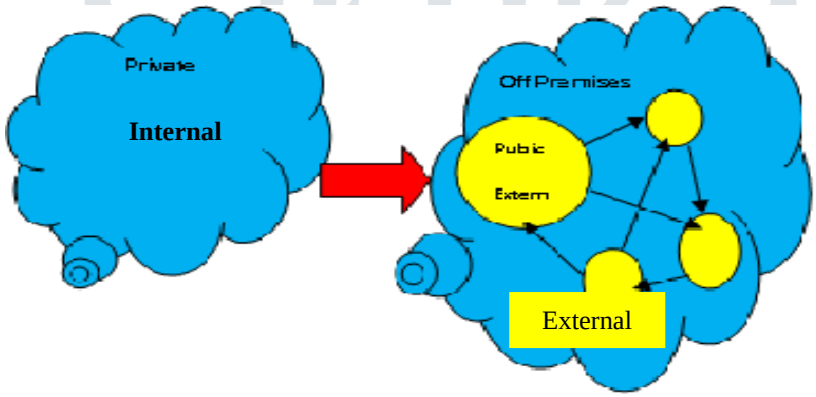
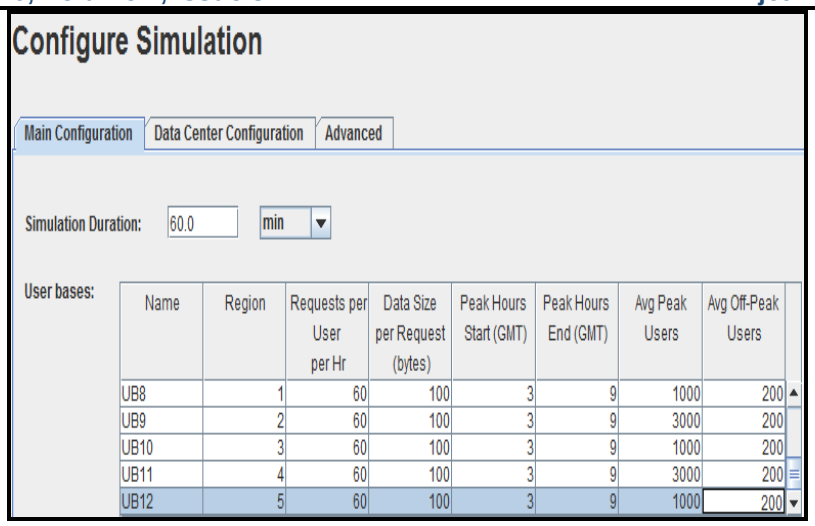


Fig 1 : basic hybrid cloud model

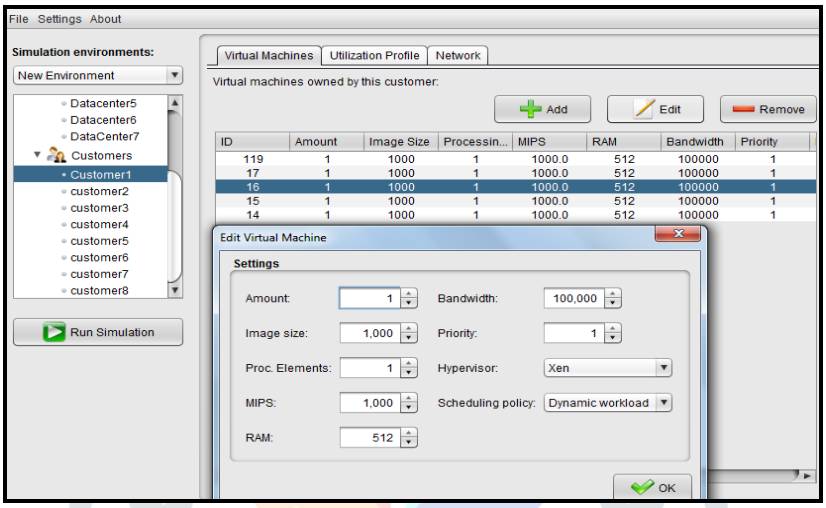
IV. EXPERIMENTAL SETUP & RESULT DISCUSSION

The experiment is set for the evaluation of mobility issue with respect to data migration and energy consumption using hybrid cloud architecture. The Experiment is conducted using cloud report (tool of cloudsim) for the simulation of evaluation of mobility issue with respect to data migration and resource utilization using different power model using two different use cases case1 for linear model and case 2 for cubic Model.. In this research paper the issue of mobility has been discussed. When servers are wasting their processing power that time the need of data migration occurs. In this experiment Hybrid cloud is modeled using at least one public and one private or community cloud. Hybrid cloud will help to provide the solution on the issue of mobility using server consolidation and data migration techniques which are used in case of migrating data from one cloud to another.

In the architecture, hybrid cloud is build upon the selection of data centre and the customers. Hybrid cloud provides solution to the issue of wastage of data centre processing power which move towards the issue of mobility with respect to data migration and power consumption (using server consolidation technique) . When both the cloud i.e. private and public clouds are used in hybrid cloud they agree to exchange the data or resources themselves through service broker as mediator. Snapshot 1 and 2 shows configuration of hybrid cloud & vm configuration of customer in hybrid cloud respectively.



Snapshot1 : configuration of hybrid cloud architecture



Snapshot 2: vm configuration of customer in hybrid cloud architecture

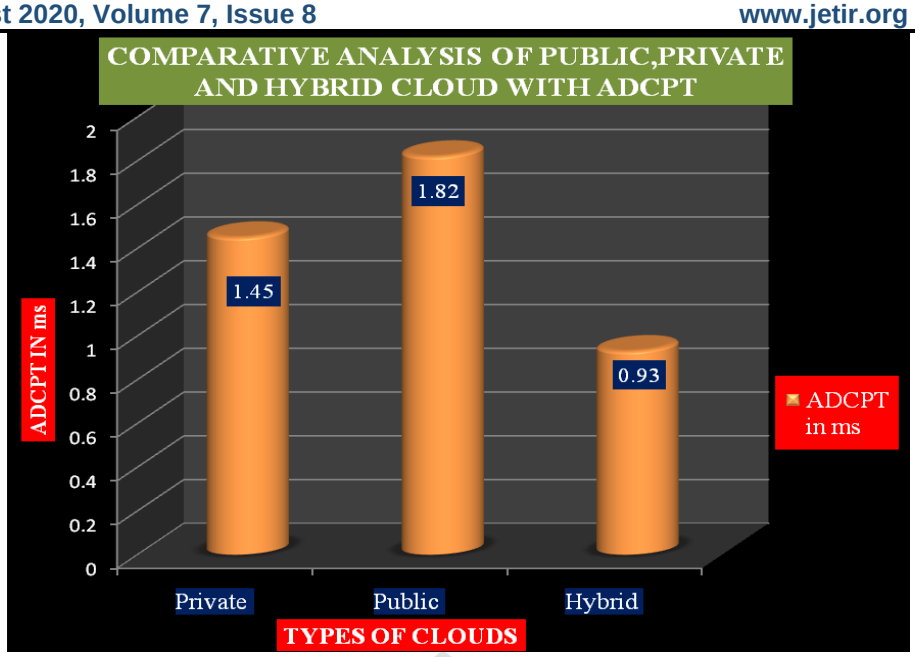
Table 1: vm parameters used in configuration of hybrid cloud

Parameters	Values
No. of VM	Less No for Private DC & More for Public DC
Average Image Size	1000
MIPS	1000
Average RAM	512 MB
Scheduling Policy	Dynamic Workload
Hypervisors	Xen
Average Bandwidth	100000

Table 2 : simulation environment of cloud provider

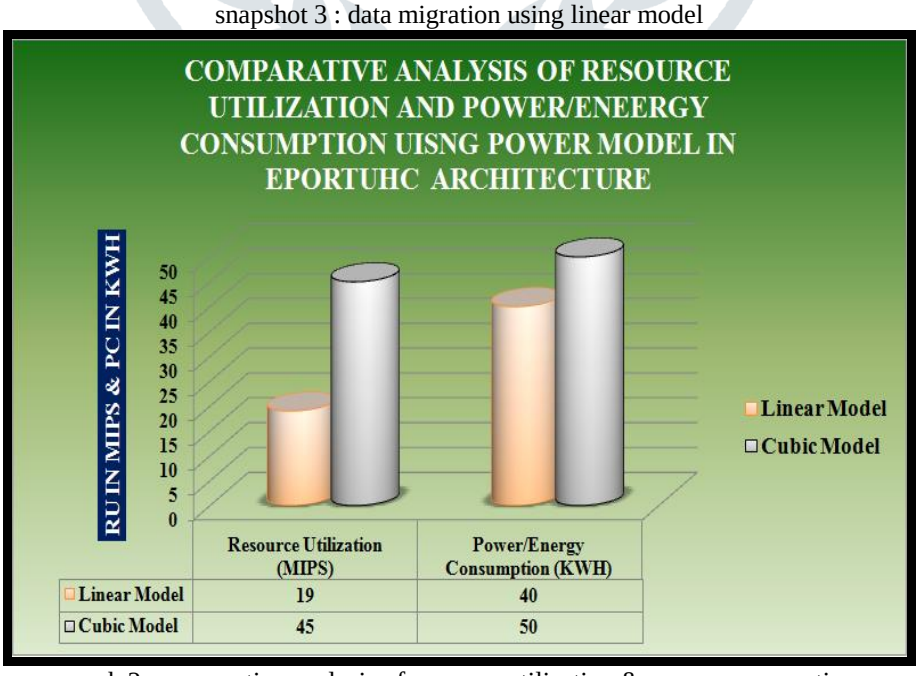
Parameters of Provider	Details
Number of DC	07
Number of Hosts	20
No.of Processing units	80
Processing Capacity (MIPS)	176,000
Storage Capacity	90TB
Total Amount of RAM	800 GB

Table 1 and 2 shows vm parameters used in configuration and simulation environment of cloud provider respectively used in experimental setup .



Graph 1: comparative analysis of types of cloud

snapshot 3 : data migration using linear model



garph 2: comparative analysis of resource utilization & power consumption

The experiment is conducted for two different use cases one for using linear model and another for using cubic model. Data migration was related to the snapshot 3 which shows that there are total six

migrations was done in the simulation . Data migration directly affect on resource utilization and power /enegry consumption of DC. More migration was increased resource utilization and power consumtion.Two migrations were used with the help of distribution techniques and consolidation was used in remaing 4 migrations for this simulation. The same experiment is conducted for data migration using cubic model. In that case total no of data migrations are 19 out of which in 9 migrations distribution technique is used and for remaining 10 consolidation technique is used. Graph 1 shows the comparative analuysis of differenttypes of cloud from which it has been observed that hybrid cloud is optimized as compared to private and public cloud. graph 2 shows the comparative analysis of resource utilization and power consumption.

table 3 : comparative analysis of power model in terms of data migrations with respect to distribution and consolidation

Use Cases	**Type of Power Model**	**Total No of Data Migrations**	**No. of Distribution**	**No. of Consolidation**
Case 1	Linear Model	06	02	04
Case2	Cubic Model	19	09	10

As number of migrations increased it directly affect on resource utilization and power consumption. In this research paper along with the issue of mobility researcher studies the issue of power consumption also. From the Table 3 it has been observed that total no of migrations using linear model are less as compared to cubic model. But the researcher is focused not only on the data migrations but also resource utilization and power consumption. From the Graph 2 it has been observed that cubic model gives optimized result in terms of resource utilization as well as power consumption. In Case 2 no. of data migrations are more but in that case server consolidation is used more as compared to linear model. Server Consolidation technique is used to save wasted processing power of data centre.

V. CONCLUSION

In this research paper hybrid cloud is modeled and simulated using cloud report (a toolkit of cloud sim) using public and private cloud by configuring no. of host and vm depends on the type of cloud. Public clouds are big in terms of configuration as compared to private cloud. Hybrid cloud is modeled using java (JDK 1.8.1) net beans. The issue of mobility is discussed in this paper with respect to data migrations and energy/power consumption. Initially in the cloud when user send request to acquire some resources or application from cloud datacenter, request first goes to private cloud and then public. The issue of wastage of data centre processing power occurs while accessing applications from cloud. Mobility is the solution to this problem. But there are issues of mobility like data migration and power consumption which has been discussed in this paper. Power consumption is the issue of mobility which depends on the number of migrations. In this research paper researcher studies the data migration issue with respect to distribution and server consolidation techniques which would help to minimize power consumption and improve resource utilization with consolidation. Server consolidation which is used in data migrations help to save wasted data center processing power which is biggest issue of mobility i.e when the data is able to move from one place to another place or one cloud to another with cloud provider and broker policy as a mediator. Different power models are used for testing purpose like linear and cubic model. Cubic model gives more data migrations but optimized resource utilization and power consumption as compared to linear model.

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