[NC-Rase 18]
DOI: 10.5281/zenodo.1484026

ISSN 2348 – 8034
Impact Factor- 5.070

GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES

REVIEW OF WORK LOAD MANGEMENT ISSUE FOR BETTER INTEROPERABILITY IN CLOUD ENVIRONMENT

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ABSTRACT

In cloud computing environment, the data to be provided and used by user is stored in data centres which are situated across the world. The cloud providers choose developed countries like USA, UK, and other European Countries for the data centres so that they can be accessed by the cloud users across the world. The data centres consist of hundreds of nodes which are hundreds in number. The data centres provided the services to users like storage, resource usage for computational purposes over the middleware which is internet. These services are provided through the power of virtualization in the form of virtual machines. The virtual machines differ in the terms of configuration like CPU speed, memory capacity, bandwidth etc. Due to the dynamic nature of cloud computing it is very necessary that the data centres should satisfy the dynamic need of users with the best quality of service. The most important aspect of this diverse nature of data centres is interoperability. This paper reviews the workload management issue for a better interoperability in cloud environment.

Keywords: *s*

I. INTRODUCTION

A cloud comprises processing, network, and storage elements, and cloud architecture consists of three abstract layers. *Infrastructure* is the lowest layer and is a means of delivering basic storage and compute capabilities as standardized services over the network. Servers, storage systems, switches, routers, and other systems handle specific types of workloads, from batch processing to server or storage augmentation during peak loads. The middle *platform* layer provides higher abstractions and services to develop, test, deploy, host, and maintain applications in the same integrated development environment. The *application* layer is the highest layer and features a complete application offered as a service. [1]

In cloud environment everything is provided in the form of a service. All these services are provided to the customers according to their need be. The need of every customer is different. Accordingly either of the service providers comes into action. Here are three service providers which are working in cloud environment:

- SAAS(Software AS A Service): This service provider allows to run all types of software without even installing them priorly.
- PAAS(Platform As A Service): This service provider allows the customer to access all platform without constructing them from basics.
- IAAS(Infrastructure As a Service):This service provider consists of infrastructure facilities like storage, servers, email servers, domain server. IAAS on demand can provide different operating systems or softwares without need to pay heavy license fees. [2]

The above services can be provided through the following deployment models:

- Private Cloud: This type of cloud deployment model is built especially and exclusively for the company customers and no other customers can access it. It is model a very cost effective model but the security provided is the reason why most of the customer opt it.

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- Public Cloud: Public cloud infrastructure can be accessed ubiquitously by all types of customers. Though security remains an issue still many facilities like fast access etc are the reasons why midsized companies choose this deployment model.
- Hybrid Cloud: This cloud deployment model is a power-pack combination of one or more private and public clouds. Hybrid cloud can be considered as a best solution to interoperability issue as it allows the data to migrate from private cloud to public cloud as and when needed. Hybrid cloud ensures safety, reliability and scalability which are the best services of private and public cloud. The best part is hybrid cloud leverages the cost benefits to a great extent. [3] [4].

This paper concentrates on the workload management issue of the interoperability problem. This would also benefit both Cloud customers and Cloud providers. There has to be much needed focus on interoperable Cloud environment which will make customers able to compare and choose among Cloud offerings with different characteristics while they will switch between Cloud providers whenever needed without setting data and applications at risk. They will interoperate and cooperate according to demand without conflicts due to interoperability problems. This work will deal with different interoperability standards and frameworks. Standardization issues need l
Interoperability continues to be an issue when cloud providers design their own proprietary solutions for managing and monitoring resources.
NIST defined cloud computing as a model for enabling convenient, on-demand network access to a shared pool of computing resources which can be rapidly provisioned and released with minimal management efforts or service provider interaction. NIST, OMG, DMTF as a part of their efforts related to standardization for cloud interoperability have developed use cases for cloud computing. These use cases are divided into cloud management, cloud interoperability and cloud security. As we cannot directly work on cloud environment for interoperability the related issues needs to be focused are as follows:

1. User Authentication.
2. WorkLoad Migration And Management.
3. Data Migration
4. Load Balancing

interoperability solutions will abide to. There are different options and techniques discovered for attaining interoperability. Reaching consensus of all top players in not an easy task for cloud computing.

Cloud computing should provide users with full benefits of cloud properties including elasticity, scalability, accessibility and flexibility. These benefits should not be limited within only one particular cloud provider. There are various protocols, standards and concepts available which specifically target interoperability problems in clouds. Cloud interoperability can be said "As an ability to migrate services or transfer data from provider to another".

II. LITERATURE REVIEW

Rajkumar Buyya, Rajiv Ranjan, Rodrigo Calheiros, in their paper "Intercloud: Utility Federation of Cloud computing Environments For Scaling Application Services", presents vision, challenges, and architectural elements of InterCloud for utility-oriented federation of Cloud computing environments. The proposed InterCloud environment supports scaling of applications across multiple vendor clouds. The approach has been validated by conducting a set of rigorous performance evaluation study using the CloudSim toolkit. The results demonstrate that federated Cloud computing model has immense potential as it offers significant performance gains as regards to response time and cost saving under dynamic workload scenarios. [5]

Jamie Loret, Miguel Garcia et. al. in their paper "Architecture and Protocol For Intercloud Communication" propose that clouds should interrelate through networking protocols in order to provide scalability, efficiency and flexibility by using services and computational and storage resources infrastructures of the other clouds. The paper proposes an architectural and protocol that allows exchanging information, data services, storage and resources between interconnected clouds. The architecture is highly scalable and permits to add new clouds easily. The protocol

designed provides node discovery and fault tolerance. The testing and analysis has been done is controlled test bench. [6]

Grace A. Lewis in the report "Role Of Standards In Cloud Computing Interoperability" focuses on the interoperability issue in cloud computing. The report proposes various solutions to interoperability problem like standardization. The research report proposes various interoperability use cases and their solutions as effort towards solving interoperability issue. It focuses on the four use cases of interoperability as follows: 1) User Authentication 2) Data Migration 3) Workload Migration and Management 4) Load Balancing. The paper proposes various recommendations as a part of solution towards interoperability. [7]

Rodrigo Calheiros et al in their paper "Cloudsim: A Toolkit For Modelling And Simulation Of Cloud Computing Environment And Evaluation Of Resource Provisioning Algorithms", discuss the importance of CloudSim simulator by a case study using dynamic provisioning of application services in hybrid cloud federated cloud environment. The application services hosted under cloud computing model are complex provisioning, composition, configuration and deployment. Evaluating the performance of cloud provisioning policies, workload management and resource performance model in different conditions and repeatable manner are very difficult. The result of the case study which was undertaken by authors, prove that use of federated hybrid clouds significantly improves the QOS requirements under varying demand pattern. [8]

Pankaj Sareen, Dr. Tirpat Singh in the paper "Simulation Of Cloud Computing Environment Using CloudSim", propose a simulator environment of cloud environment called CloudSim. The authors in this paper reveal that testing of any algorithm in real environment of cloud is very difficult. The authors propose that CloudSim simulator helps to test and analyze the real cloud environment. CloudSim toolkit supports both system and behaviour modeling of cloud components like data centres, processors, virtual machines and resource provisioning policies. All these are tested and analyzed in CloudSim with limited efforts and costs. The paper discusses the power of CloudSim and all the variants of CloudSim like Cloud Analyst, Cloud Reports etc. [9]

Prof. S.M.Ranbhise, Prof. K.K.Joshi in their paper "Simulation and Analysis of Cloud Environment" focuses on the advantages of cloud environment. There are different resources in cloud environment like Virtual Machine, CPU, resource, Memory, Hard disk space of server machines located in data centre. The server machines are consuming energy to provide services to users in cloud computing. For analyzing the resource allocation in cloud computing environment which is scalable to n servers then we will require Cloud simulation and modeling tool which will take create the cloud as per requirement. This paper analyzes simulation of cloud on CloudSim and Cloud report for better analysis of cloud environment. [10]

III. WORK LOAD MANAGEMENT

Interoperability refers to moving of data from one cloud environment to another when two clouds make mutual agreement for exchange without bothering or changing the semantics. For effective implementation of interoperability the basic need of exchanging or transferring the workload among different clouds without any issues is very important. The workload can be transferred from public to private or vice a versa. Thus, workload management can be viewed as one of the important issues of interoperability. Workload management literally means finding the most appropriate virtual machine in a specific data centre with the help of combination of broker policies and load balancing algorithms.

To move out for workload management with respect to interoperability basic need of workload management and its proper approach should be thought of with respect to time, cost and energy efficiency. The interoperability implementation in cloud environment would be at its best when all the metrics such as resource utilization.

Cloud workload is an agglomeration of many dissimilar applications and services, having different performance and resource requirements. They are also constrained in the form of Service Level Agreements (SLAs). Many factors affect cloud performance such as the variability in the resource and network conditions and the highly vibrant nature

of the workloads. This totally depends on user interactions. In this scenario the use of virtualized resources could lead to performance degradation. This degradation is the consequence of heterogeneous workloads on the same physical infrastructure and also due to the overheads caused by the resource management policies being implemented. The blend of workloads concurrently executed on a given virtual machine (VM) may lead to degradation in performance because of incompatible usage of resource. These performance issues could become even more critical in federated cloud environments where the workload is distributed across different cloud infrastructures. Hence, effective deployment of cloud technologies and workload management it is of utmost importance to expect and get desired service levels and QOS parameters.

Workload management is the management of inputs i.e. applications, services, transactions, data transfers submitted and rocessed in a cloud environment. Cloud workloads are batch mode and not hard real-time applications. Workload management is an important issue but very less study has been done on this. So for deeper knowledge, pattern of cloud workloads i.e. their qualitative and quantitative attributes are studied to identify some broad categories specified in terms of various dimensions as given in the diagram.

IV. SIMULATION STUDY OF WORKLOAD MANAGMENT

In this experiment workload migration and management are studied in terms of broker policies and scheduling algorithm. The study evaluates different broker policies along with different scheduling algorithms and their role towards workload management. The experiment selects most appropriate combination of broker policy and scheduling algorithm for workload management in hybrid cloud.

The study has been done by focusing on the issue of workload management and the metric for evaluating the performance was Execution Time. The user first sends a request which is processed by the Data Centre Controller and then forwarded to Data Centre Broker which decides the best broker policy to implement according to the need of the user. The broker checks the data centre for allocation according to the need of the user. As the suitable data centre is chosen the next job of the broker is to choose the virtual machine to assign for the workload to execute. The VM LoadBalancer decides the appropriate allocation of load balancing policy to be implemented. The User Base Generates the Internet Cloudlet and the Internet redirects the request to Service Broker for Data Centre Controller selection. The service broker makes use of the service broker policy to decide the data centre to be assigned to the user request. In this experiment the study was done on all three broker policies with respect to interoperability in hybrid cloud [11] . On studying all the three broker policies it has been decided that the best broker policy would be which gives best execution for the workload to be executed in hybrid cloud while interoperability is being facilitated.

ISSN 2348 – 8034
Impact Factor- 5.070

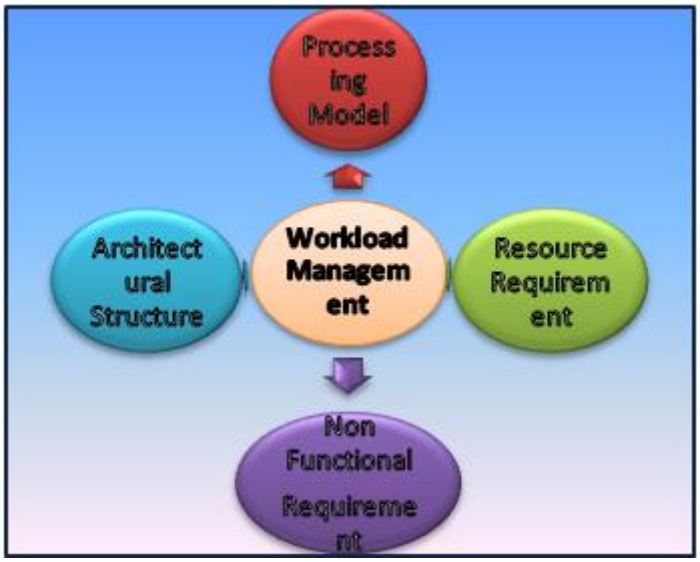
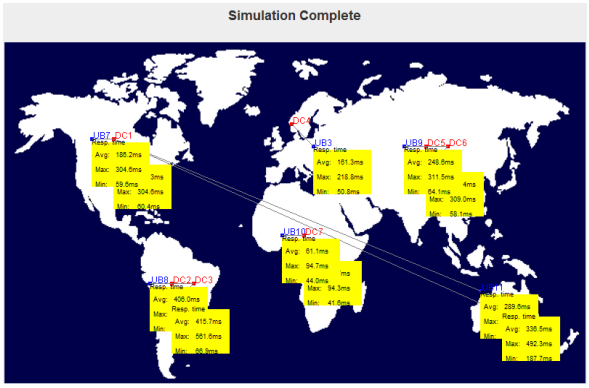


Figure 1: Workload Management



workload management

V. RESULT & DISCUSSION

The performance of workload management in hybrid cloud is studied using utility based resource distribution policy i.e. Response Time. This means that the resource distribution is done dynamically as per need of the user which expects that the workload management is done to the data centre which has least response time.

In cloud computing there are two players on is cloud provider and other is cloud user. The cloud provider holds massive high speed resources clubbed in data centres to be provided to the users on a pay per use basis. The cloud users rent these resources in a variable approach. The user's view of resources is just to generate as much as profits in a less investment. There are various such users in the environment with varying workloads and also varying number of resources demand. Thus in short these massive high speed resources are shared in the cloud environment to maximize resource utilization thereby generating more money and less cost to put in. But this does not go that smoothly i.e. if the resources are not used efficiently then either the virtual machines providing the resources are overloaded or under loaded. The user wants the resources to do as much work as possible in less cost. This situation is addressed as efficient resource utilization.

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Thus in the workload management there should be ideal workload allocation to the resources without any overloading or under-loading which inturn provides energy efficiency and less execution time.

VI. CONCLUSION

Interoperability issue in cloud environment is very well addressed by using hybrid cloud framework. The cloud federation or hybrid cloud technology is still in its development stage. The hybrid cloud architecture proves out to be a better solution for interoperability. It can be concluded that hybrid cloud architecture helps to achieve better interoperability as it is a powerful combination of public and private clouds which takes care of continuity of service and also boosts the reliability of the participating Cloud providers.

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