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A Comprehensive Study of Energy Efficient Saving Task Consolidation Algorithm for Cloud Computing

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ABSTRACT

The powersaving in a cloud technology surrounding is a multifaceted challenge, which can directly reduce the in use costs. Task consolidation is a technique to raise resource usage. However, the greatest use of sources does not implies that there is convenient utilization of power and some resources which are unused resources also consumes significant amount of energy. Recent studies show that the power consumption of unused resources is 1 to 19%. Therefore, the idle resources are allotted with some task to make completely effective use of the idle period so that there will be overall minimum energy consumption.The advancement of technologies like software applications and system gadgethavebuild cloud technology a desired computing standard. Acquaintance procedure of managing are needed to link them together and build these resources use in the best possible way at various scales. So, to lower the power consumption of data centre. The general purpose to minimize the cost of datacentre Thus the procedure has inspired the goal to keep a brink level for CPUS with greater levels of usage for energy saving. If there is a greater CPU utilization that doesn't equivalent to energy efficiency within that system.Power consumption is determined by hardware effectiveness. It is also dependant on the effectiveness of application running in the system and dependant on the resource saving system used on the infrastructure. Cloud computing can minimize labour costs, IT capital costs and increase productivity. Cloud technology refers to framing, handling and retrieving the hardware and software resource remotely. The objective of study is to review on Cloud offer configuration, online data storage and application.

1. Introduction

Cloud computing is a significant impact for building our business application adaptable and collective.

The concept of cloud comes into existence in the year 1950 with utilization of mainframe computers, available via thin/static clients. It offers networked development and development appliance, programming runtime environment through PaaS model. Cloud can design and handle the application accessible at any time. Cloud is greatly profitable because it run at greater efficiency with optimal usage. Cloud provides load balancing that make it more predictable and cloud just require an internet connection. Cloud does notneed to fita software to handle cloud application. Some of the issues one must consider in cloud computing are data privacy and

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security requirement, training requirement. Cloud computing value proposition key factors are business mode innovation, IT management simplification andhigh service quality. All these factors liable for upcoming progress. In cloud planning phase key factors is IT planning development, Business architecture development, transfiguration plan development. In IT, architecture development we find the approach that promote the business procedure and the technical knowledge required to support business applications and data system. A set of quality assurance refers to the unproductive requirement such as disaster recovery, safety, accuracy etc. The benefits of relevant cloud computing mode depend on this unproductive feature. In business planninggrowth we recognise the prospect that might be lead to cloud computing application from business point of view. In transformation phase, we develop all kinds of plan that are needed to transform current business to cloud computing modes. Cloud provider gives maintenance and technological service. They need to ensure the Quality of service. For selecting cloud technology provider on basis of (SLA) which define the level of service the provider will meet. There are certain working behind the cloud technology platform which makes cloud computing usableflexible and dependable. These technologies are listed below:

a. Utility computing
b. SOA
c. Grid computing
d. Virtualization

1.1. Utility Computing

Utility computing gives gaugesources on demand. The concepts of utility computing are Cloud technology, grid computing and managed IT services

1.2. SOA

It helps for using appliance as service for other applications disregarding the type of product or technical knowledge. So, it is possible to interchange the data between application of different retailer without extra programming on making changes to services.

1.3. Grid computing

It refers to distributed computing, in which a group of computers from several locations are linked with each other to gain common objective. These computers resources are different and geographically distributed. Grid computing breaks compound task into small pieces, which are distributed to CPU that reside within grid.

1.4. Virtualization

Virtualization is a approach, which allow to divide single physical occurrence of resource among several organisation or tenants.

2. Cloud Technology

Cloud technology is a greater level of benefit that is operated with minimum managing effort, often over the internet. Storage devices, low-cost computer, high capacity network, utility computing led to improvement and growth of cloud technology.

2.1. Characteristics of Cloud Computing

Broad Network Access: It provides platform independent that is you can run some code with little or no modification on multiple platforms.

Rapid Elasticity: Resources, which have ability to provide scalable services or itis used for scalable provisioning.

On-demand service: It is an automatic process and a delivery model and the model is characterized by three attributes pay-per-use, self-service and scalability.

Security: It refers to wide set of application, control, policies and technologies to protect data, application, services and virtualized IP. It is a subdomain of information security, network and computer security.

Performance: Performance testing must be properly organized and designed due to complexity of cloud computing.

Measured Service: One need information about the current demand on the cloud inorder to know when to scale up or scale down.

Vertical Scaling: Adding of processing power (CPU, RAM) to an existing machine to make it fasteris known as vertical scaling.

Horizontal Scaling: Adding of more machines into pool of your resources is known as horizontal scaling.

3. Cloud Models

There are various types of cloud models are available to the user.

3.1. Cloud Deployment Model

3.1.1. Public Cloud

Here cloud services are available to public. The cloud resources are shared among every organizations, government, every individual and medium and small enterprises etc. Third party provider provide cloud services. The examples of public cloud are EC2 (elastic compute cloud), Amazon, Google App Engine etc.

3.1.2. Private Cloud

Here cloud services are available for only a single organization. Here security is more concern because a single organization can access the resources from the cloud. Here any third party or any single organization manages the services or services are managed internally.

3.1.3. Hybrid cloud

It combines private cloud and public cloud. It wants to host their data on a public cloud and best suited for organizations that want their application to be secured applications. It is cost savings with hosting shared applications and data in public cloud.

3.1.4. Community Cloud

Here cloud services are shared by several organizations that have the same policy. The third party or any organization from the community cloud will manage all the infrastructure (Figure 1).

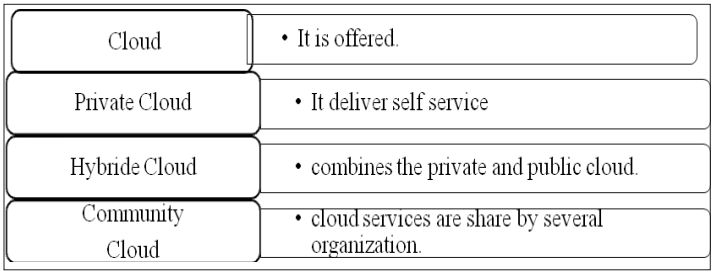

Figure 1. *Cloud deployment model*

3.2. Cloud Service Model

The service of cloud model is summarized below (Figure 2):

3.2.1. IaaS

IaaS provides virtualized computing resources over the internet. AWS (amazon web service), Xen, oracle VM, KVM are example of IaaS. IaaS involve the use of cloud orchestration technology which means it is the automated configuration, coordination and management of computer system like open nebula and open stack and IaaS provide additional resources such as file or object storage, firewalls, load balancers, VLANS, IP address, raw block storage and disk image library.

3.2.2. PaaS

PaaS is platform as a service, which allows high level programming with dramatically reduced complexity as the result is more effective due to maintenance and enhancement of the application, which is easier. Microsoft azure and Google app engine are examples of PaaS. PaaS free users from having to install in house software and hardware to develop or run a new application.

3.2.3. SaaS

It is referred to as on demand software; web based software and hosted software. SaaS is a common transmission for multiple business application such as message software, DBMS software, CAD software, virtualization,CRM, management information system, gamification etc. Saleforce.com is one example of SaaS.

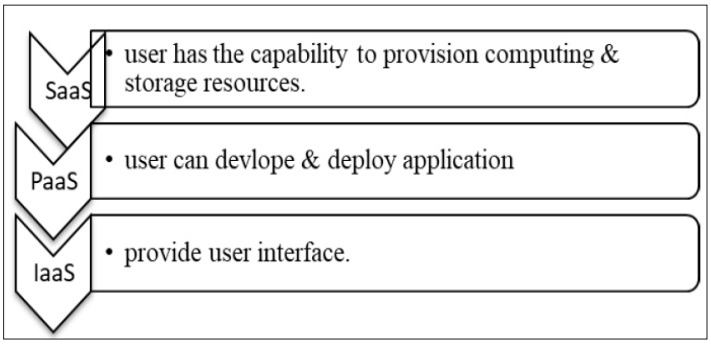

Figure 2. *Cloud Service Model*

The above cloud model helps in various applications like energy system, transport system and health care, education to provide value added service with minimal expenses.

3.3. Cloud Architecture

The below figure,three describes hybrid architecture of cloud andsubdivided into two parts:

i) CPA

ii) CAA

i) CPA

Cloud platform architecture is divided into following subparts and it is known as CPA.

3.3.1. Distributed Resources of Physical Host

Here the The resources are may be the CPU cores, memory, processors and virtual machines. It balances computing workload with available resources such as memory, processor, CPU cores etc.

Cloud Hypervisor: It is known as virtual machine manager. It is a computer software and hardware which creates virtual machines and run virtual machines.

Native Hypervisor: It monitors all the guest operating system and runs directly on the host hardware. Example is KVM.

Host Hypervisor: It provide virtualization services such as memory management.

Virtualization: It partitions the physical resources into multiple virtual machines. It partition resources (memory, computing, network, storage etc) of a physical server.

Virtual Machine: It provides performance, flexibility, and scalability. It is a operating system which perform tasks such as running application, and program like a separate computer.

Distributed Service Assurance Platform: It allows configuration, security, performance, account and fault. It executes the applications and allows hosting the operating system.

3.3.2. CAA

It is based on software-orientedarchitecture and is known as cloud application architecture.

BSP: It is known as application service provider, which provides a profitable or practical way to acquire an application via network, and is known as business service provider.

Virtual Appliances: A software image provides a webpage user interface to permit their configuration.

Agent Based Layer: Here the agents are act like a broker in between the business service provider (BSP) layer and virtual appliances layer.

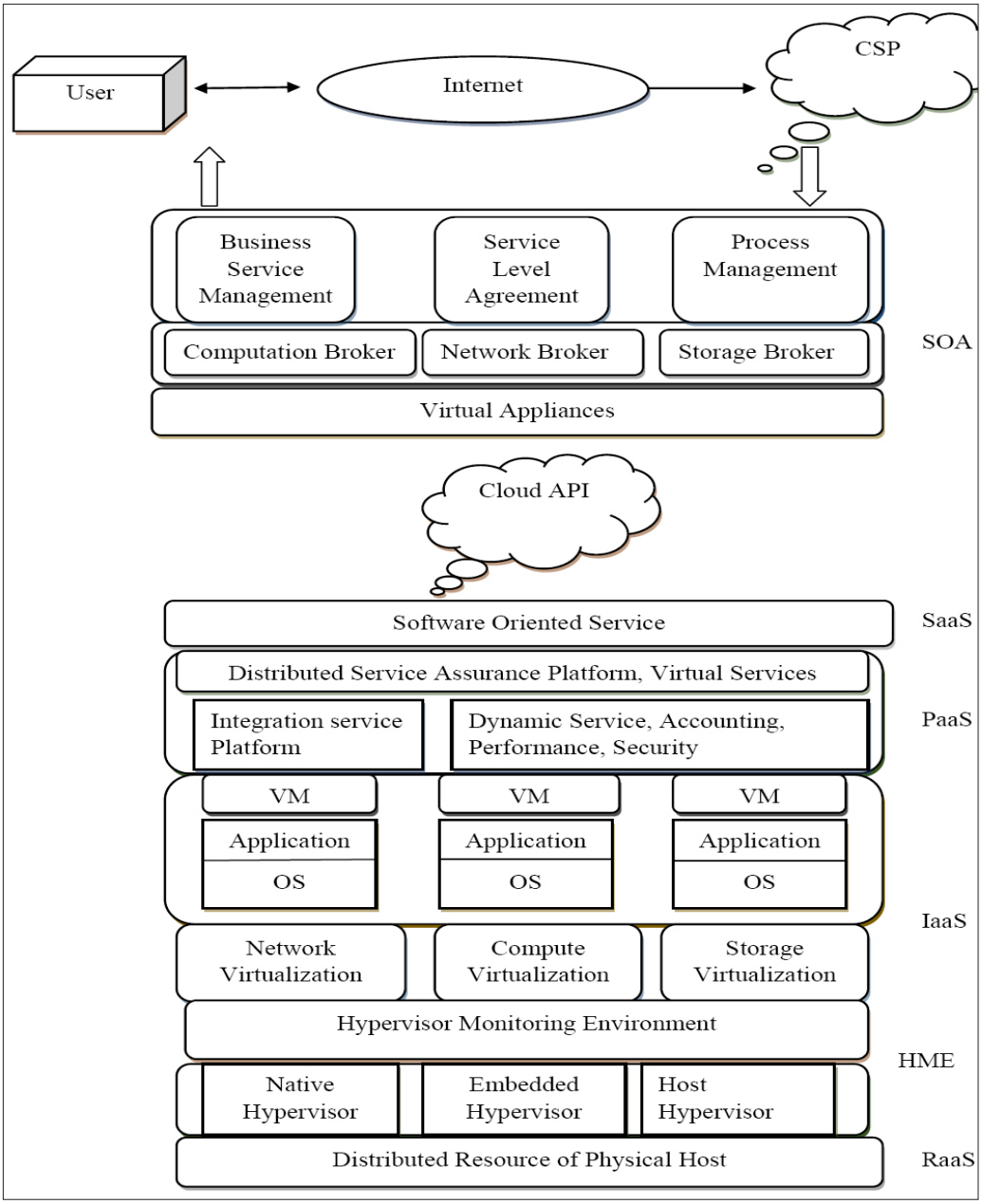

Figure 3. *Architecture of Cloud Computing Environment*

Several literature surveys on cloud technology is broadly used for its variety of services, namely IaaS, PaaS and SaaS according to Buyya et al., 2009. It is very much important for properly using the resources. However, effective resource utilization does not imply energy efficiency according to Hsu et al., 2014. The main purpose is reducing the total number of resource utilization that results in increasing resource usage of active resources. For example, information and communication technology resource consumption is about 9 percent of whole power consumption in US every year and it is presumed to reach about 51 percent in the upcoming year Mills et al., 2013; Hohnerlein et al., 2015. Using coal and natural gas 66 percent

of electricity is generated. As a result, some practitioner's main purpose is of reducing power consumption [5, 6] and other objective is to increase resource utilization Pand et al., 2015; Li et al., 2013. Maximum of the current experimental works Hsu et al., 2012; Lee et al., 2012; Panda et al., 2012 pay particular attention on objective that allot the client tasks to VM that results in reducing energy consumption. Moreover, it turned off the unutilized virtual machine for preserving energy. The IT devices are drawing the considerable load of power; power consumption is a key issue in the discipline of cloud technology. Many researchers Fan et al., 2007have suggested energy efficient algorithms to minimize the energy consumption. One of the feasiblesolutions is to transfer some of the client job from minimum load resources to the resources, which are active by making the minimum load resources in turn-off mode to minimize power consumption. Srikantaiah et al., 2008 have suggested introduction of the task association problem as bin-packing problem.However, the problem is considered in terms of disk resources and CPU. Chen et al., 2015 have introduced sensitive and dynamic arrangement procedure for real time task in cloud technology. An application software based proposal that include two techniques, namely load dispatching and Chen et al., 2008 have suggested dynamic provisioning. The first one aims to share load among active resources and the second one objective to switch on the least number of system resources. To deduce the optimum configurationan automatic controller is used by Tesfatsion et al., 2008.Two energy effective task consolidation algorithms to reduce the energy consumption have been suggested by Lee et al., 2012; Durao et al., 2015; Buyya et al., 2009. The algorithm is purely based on cost function that chooses a VM for a ready task. This algorithm in this paper is different from Hsu et al., 2014; Khemka et al., 2014 in the following manner.Energy in different to Lee et al., 2012 by allocating the task in ascending order of fitness value.

In the upcoming years, several task scheduling algorithm have been designed to solve various problem of cloud technology. However, quite few researchers have found the issues of energy consumption of cloud technology. Chandrasekaran, 2011 have provided a virtual machine scheduling algorithm, which give resource based on the energy cut price or budget. However, the evaluation of energy consumption gives an error rate less than 5 percent of the total energy consumption.Besides, it also suggested a hierarchical scheduling algorithm for application to reduce the energy consumption.

4. Conclusion

However, the application selects the nodes with low temperature for scheduling assessment. It symbolise an energy aware task consolidation technique to reduce the energy consumption by restricting the CPU use up to certain limit.

Conflict of Interest

The Author has no conflict of Interest.

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