



EFFICIENT POWER UTILIZATION OF CLOUD COMPUTING RESOURCES

N.Deshai¹, R. Shiva Shankar², K. Sravani² and P. Neelima²

¹Department of Information Technology, S.R.K.R Engineering College, Bhimavaram, Andhra Pradesh, India

²Department of Computer Science and Engineering, S.R.K.R. Engineering College, Bhimavaram, Andhra Pradesh, India

E-Mail: desaij4@gmail.com

ABSTRACT

In the current digital planet, the size of the data centre has been increasing significantly but it comes at the cost of some major issues, especially a huge consumption of power. Cloud computing has been an emerging paradigm which provides services propagating across the digital world as well as it offers advanced virtual computing resources across internet with least management hazards. However, the whole computing resources face the main pitfall which is extremely energy consumption aspect which usually requires tremendously high energy consumption especially in case of unutilized resources. Hence the output comes with a big impact on the entire environment. In this paper, we target on the comprehensively optimized way of arrangements of virtual machines to balance the resource management across the cloud. In the digital age, there are countless techniques and several algorithms are proposed to reduce the consumption issue especially power and energy in the cloud. Few major techniques like dynamic voltage and frequency scaling DVFS, virtual machine migration and virtual machine consolidation are the key solutions to address this issue.

Keywords: cloud computing, big data, consumption, optimization, resource allocation.

1. INTRODUCTION

Cloud computing is an advanced technology for allowing well-situated on-demand accessing from anyplace to a shared pool of computing property, these can consist of servers, storage, network, applications and major services [1]. The purpose of the cloud computing is to provide huge meaningful services on the resources to over the world end users, in general, the essential demand is too easily access every essential resource as an inexpensive way at anytime, anyplace like more significantly. Cloud computing is an extremely expanding technology which makes metering support services to clients as shown in Figure-1.

The essential reason fast growth of cloud utilization is due to cloud computing significantly presents ITC oriented services and offers advanced virtual computing resources across different cloud-based internet as shown in Figure-2. In the digital world every data centre is a major source of cloud computing in which includes a group of servers on different organization information being stored and run various applications efficiently [2].

Typically digital world data centre include different servers, various network, the variety of cables, some sort of air conditioner etc, however, which could tremendously being consumed large power and extremely releases the massive quantity of Carbon dioxide-CO₂ to the surroundings. Most cloud computing services being generates a request based on input parameters, which could result in limiting and avoiding hackers involvement. There have been a large significant number of practical research on dynamic and essential power and great potential management elements are necessary which reduce poor utilized types of equipment in a data centre for the purpose of to significantly reduce the total energy consumption from major power consumers and huge utilization in a data centre or servers and communication

networks and the cooling systems as shown in Figure 3 and 4. Which is able to be quickly and simply provisioned as well as released the cloud replica includes 5 important characteristics: On-demand own service which allows every user to hurriedly and robotically obtain the permission of access to the IT essential resources which they want not including necessitate some supplementary human interface [3]. Extensive network right to use which has an excellent facility to easily access any service rapidly from every standard device which can be connected to the network elements include PCs, laptops, mobile, phones or tablets.

Huge source pool computers, major network and all storage devices are united and provide sharing facility across numerous clients. Quick flexibility especially which accepts to promptly extent or get smaller every capability about cloud to equal the intensity of customer requirements [1]. Measuring device path and control the stage of every resource service utilization or the price of resource utilization. Clients normally decide one of three choices about their own cloud employment moreover more public cloud, specific private cloud or advanced hybrid cloud. Typically a private cloud has been excellent service for the selected users of a particular association also every infrastructure which is frequently possessed, handle and work through the individual institute by its personal firewall. An open cloud is openly used by the all-purpose.

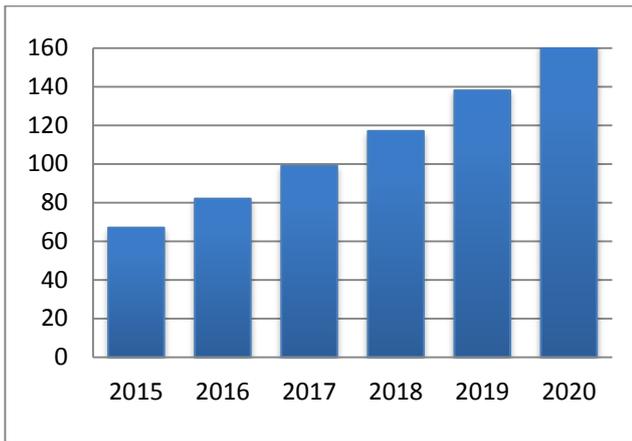


Figure-1. Fast growth of cloud utilization.

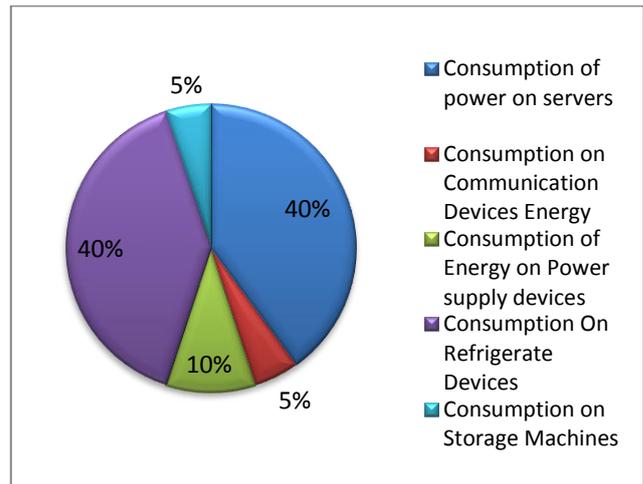


Figure-4. Data Centers Energy Consumption.

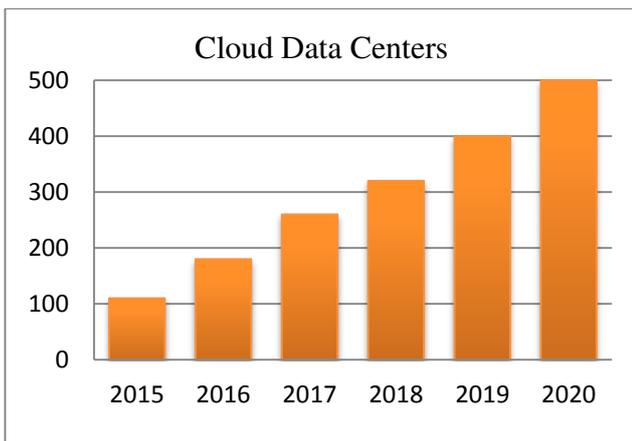


Figure-2. Fast growing of cloud data centers.

A public cloud which is a general sort of cloud could be possessed, control and manage with the help of cloud service supplier and executing on the provider premise. A mixture(Hybrid) cloud agrees to a consumer to right to use mutually private and public cloud assets by a distinct organization surrounding in adding here three different categories of IT facilities offered nowadays during public plus private and hybrid cloud sources [4]. The primary is the software as a service or SAAS which permit every user to easily right to use any application with no having to manage support or some sort of controlling the basic cloud infrastructure element. Example of SAS like Gmail.

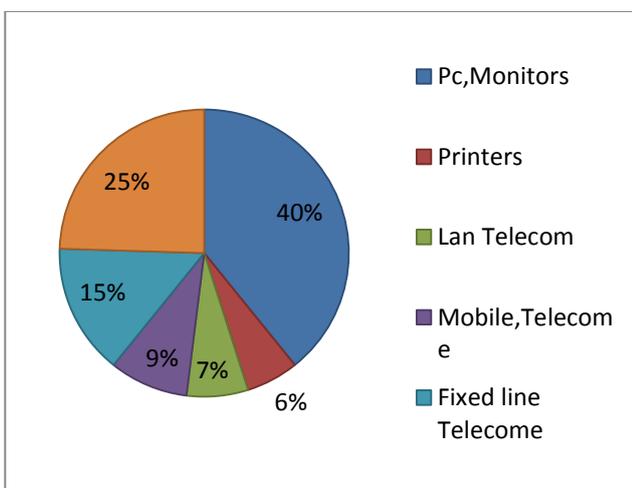


Figure-3. Expected ICT CO2 discharge.

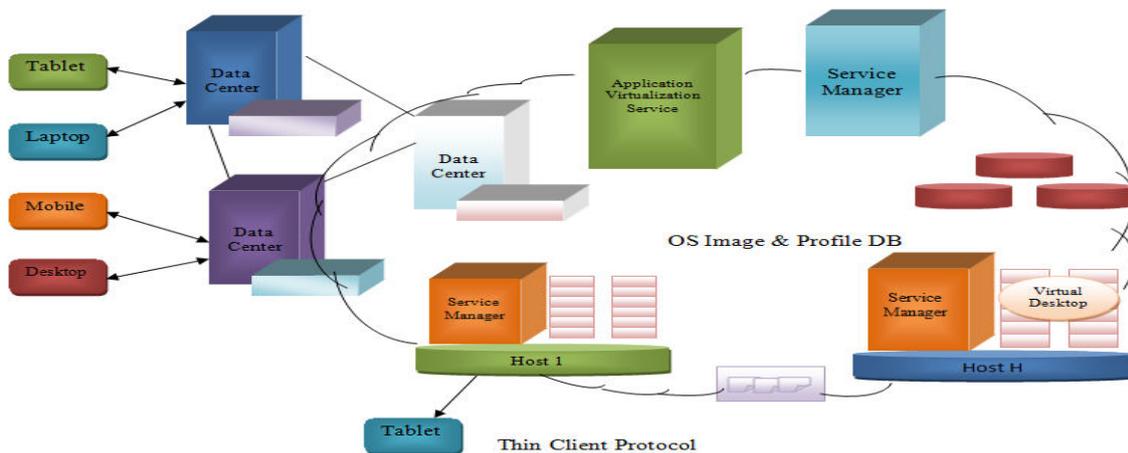


Figure-5. Cloud computing architecture.

The second is the platform as a service which efficiently provides to users for easy access to every software environment to permit them to make their individual cloud functions with programming language libraries services and some types of tools. The consumer has been manage over applications not including having to handle or manage the fundamental cloud infrastructure is an example of Paz is a cloud factory. The third infrastructure as a service which permits every user to hurriedly and simply provision complete computing assets include dealing out storage elements and networking process not including the user involvement to handle or organize the essential cloud complete infrastructure an example is Susa unlock that cloud the majority data centers as shown Figure-5.

2. Background of cloud computing

2.1 The uniqueness of cloud computing

High ability plus reliability: Our ability of server is very high and it's an additional reliable since the chance of infrastructure breakdown is minimum. *More scalability* which means real-time on-demand provisioning of all types of resources based on a huge scale means whenever the user needs a more server with a simple click they can increase the server and whenever they don't need they can decrease the server. *Multi sharing* by the helping of cloud computing many user and all applications can do their job high efficiently and they can be lost they can cost less because they are sharing a common infrastructure. *Device location independence* means cloud computing enormously the user to access a system from the web-based browser in spite of their current location and which kind of devices are using with the location independency user can access a particular software or any system from anywhere because the infrastructure presented by the third person and user access using the internet so they preserve access from anyplace [4] [5].

2.2 Maintenance on Cloud Deployments

Protection of cloud computing application could be very easily because customers no require to access it

from the particular local PC maintenance can be done by anywhere reducing the cost by utilizing a cloud. Computing the low price will decrease because the IT corporation no requires to put infrastructure on that possess they just need to purchase particular software and infrastructure from the third party so it reduced the cost. Service in pay-per-use mode cloud computing provides the API's with this API is user can use a cloud services on basis of this cloud core services user can pay only what they using the service can be charged as a monthly subscription yearly subscription or any kind of other applicable in the next video we are going to see the advantages and disadvantages of cloud computing [3]. Benefits Abundant available of energy. Equipment efficiency. Dynamically allocated resources. Conciliated eliminate central costs. Save money, Reduce cost burden on customer Cost savings from increased efficiency.

In the current digital planet, many organization computations especially depend on particular data enters which are tremendously and significantly being consumed the massive quantity of energy and power which seems to be more expensive and a great impact on large scale applications and many fields [6]. On power mechanism and energy consumption mechanism focus a significant examination and research being conducted for easily solve and reduce the energy consumption issues in terms of shuts down the all unutilized equipment digital world data centers. In typical, majorly consumes huge power on digital world applications and their data centers from some sort of cooling machines, major types of networking devices and major servers. Huge research is essential for easily understand the impact on significantly consuming elements. Although a major difficult problem is to making optimization on power especially in major data centers due to some sort of server resource constraints, measure network topology and bandwidth elements, virtual machine migration different format and structure of workload also server's. Every sort of arrival plus departure job and the new and completed job which has been significantly created workload in time element. As an outcome majority of the existing research has been focused only on half has done optimization of power



utilization but which could be optimized each type of server also some sort of network consumption especially on the power with the help of the virtual machine.

Especially to make sure optimization and minimize the power consumption regarding temporal based which is a time function and massively has been studied. So which is estimated by huge demands on electricity for different data centers to increase higher than 70 per cent over 2012-2034 according to the way of result which has been performing essential research and analysis on how smoothly to reduce and avoid data centers power consumption issues. Which has been evaluated typically any ideal server which consumes probably 70 per cent of its highest power is general to reduce consumption especially from power with the help of dynamic power management along with the server appropriation and consolidation has been utilized server consolidation which is referred to all virtual machines. The main and foremost concerns over which are using cloud have been expensive which in terms of network traffic using of many physical machines [7].

Few major techniques similar to much dynamic voltage and frequency scaling, virtual machine migration plus virtual machine consolidation. Major Algorithms are Maximizing Bin Packing, Power enlarge based on Minimum-Maximum and Migration ensure Minimization, top Potential enlargement, Random option. The most important objective of all these techniques has been extremely optimizing the power consumption in cloud environment. This paper presents detailed survey on techniques regarding have huge efficient energy on cloud deployments.

3. Related Work

In the digital planet, visualization is a key element has been certified an excellent technology for gaining fast resource sharing in cloud data centers. But this fast and reliable resource sharing mechanism is a still major challenge for the cloud organizers. In present virtual based cloud data, centers are Amazon ec2 and Cisco data centre especially virtual machine arranging has been the first issue in terms of a defect in the scheduling of cloud resources. An advance and excellent replacement will carry efficient resource utilization and the low cost. Generally, we use a particular slot to indicate one of the fundamental research units including CPU disk and a memory. Every slot which can host as one virtual machine tenants accept the resource selection requirements in the form of multiple virtual machines slots to cloud systems. The cloud which decides the remaining resource allocation process which is the well-known process the virtual machine placement which is also basic and a major function requirement of the cloud manager to reach and solve the necessary virtual machines. Cloud computing services have been significantly propagating across the digital world however the whole computing resources being face main pitfall which is energy consumption things.

4. Cloud Environment Based on Allocation Power

4.1 Energy efficient through allocation power aware cloud environment data center resources

a) Optimize through the each job performance plus consumption

Major issue which is the consumption of power in transportation which characterizes a significant quantity of whole consumption on power on behalf of cloud storage service at average and high handling rates. In cloud computing environment One of the major essential challenge is optimization on energy consumption and hence have a green cloud computing [8, 12].

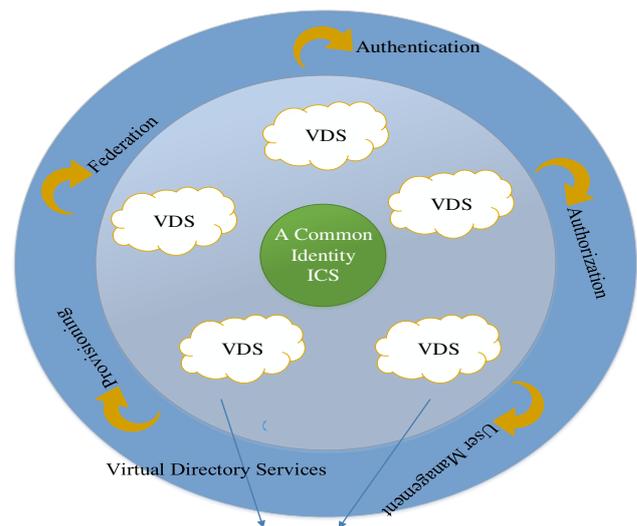


Figure-6. Virtual Machine (Via) Virtual Migration Framework.

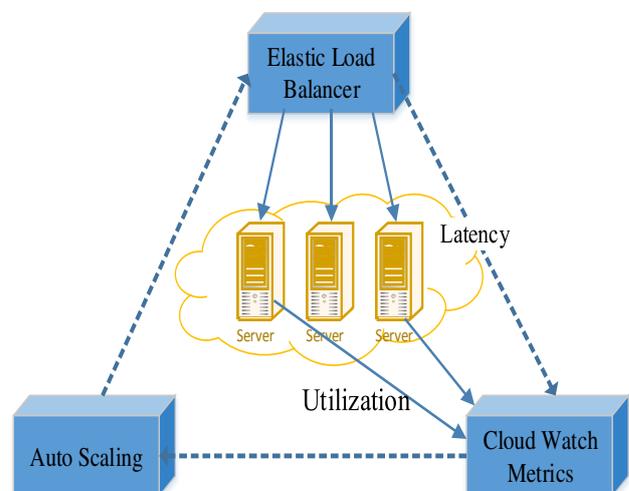


Figure-7. Load Balancing.

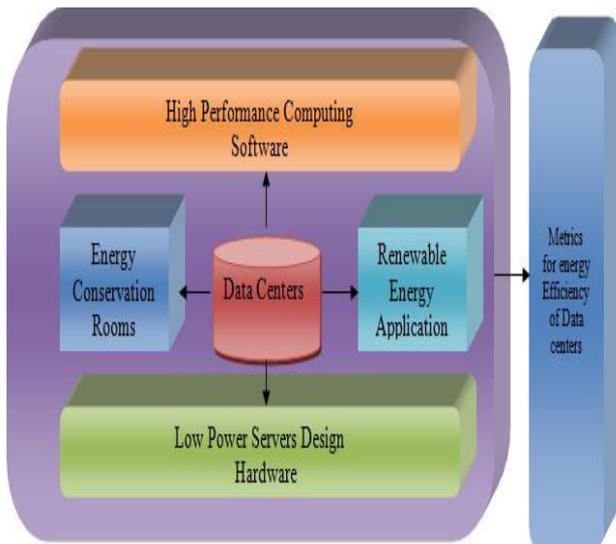


Figure-8. Energy Conservation Framework.

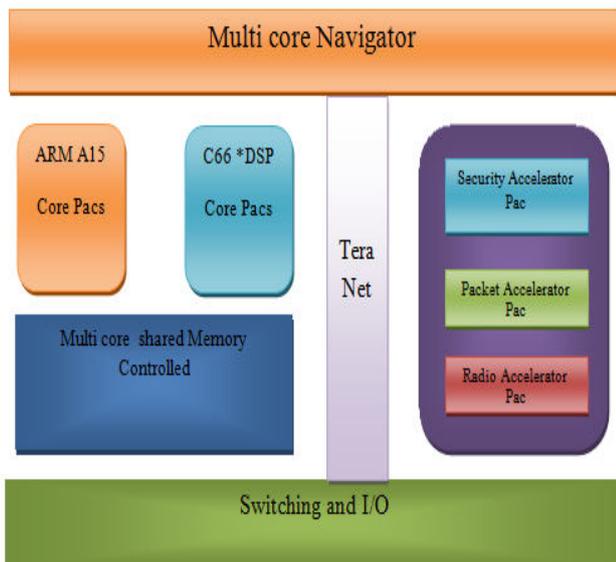


Figure-9. Multi core Key Stone construction.

b) Way to achieve consumption scheduling algorithm

A scheduling algorithm which is dictates how much CPU time is allocated to process and threads.

c) Virtual Machine (Via) Virtual Migration

Virtualization procedure which could significantly handle the most frequent essential task for digital world computing aspects, storage elements, and communication resources during large cloud computing data centers [10]. Which assist to accomplish various resource organization objectives regarding load balancing, effective maintenance on online system, practical fault tolerance, tremendously manage energy, and heterogeneous resource sharing by migration of Virtual Machine as shown Figure-6. Especially migration is a resource demanding method as VM's always demanding for suitable CPU cycles, memory specifically as cache, capacity on memory, and appropriate communicating bandwidth.

d) Auto Scaling

Which is frees during to make the prediction on enormous traffic point more accurately and preparation ensure provisioning sort of resources in go forward of them [11]. Through auto, the scale could be put together a completely scalable along with reasonable infrastructure on top of the cloud. load balancing steps forward the significantly distributed each workload across entire computing resources like number of computers, some sort of clusters, many network associations, CPU, or disk drives The main goal of load balancing to extremely optimize resource way of utilization, significantly maximize throughput, decrease response moment, and typically avoid overload of from every resource as shown in Figure-7. By utilizing several components through load balancing instead of using distinct component could enhance more reliability and high availability based on redundancy [9]. Load balancing regularly engage committed software or hardware, which are multilayer switch also DNS (Domain Name System) server procedure. Specially balancing on load which is equalize the entire workload between the notes through the decrease total execution time, reduce all communication delays, scale the resource utilization and the throughput they are various load balancing algorithms such as round-robin, Map Reduce, randomized, ESEE, a throttle, biased random, min-min, max-min, token routing genetic algorithm active clustering each having its own pros and cons in different scenarios [14, 15].

5. Energy maintenance structure

The more advanced and well efficient technologist cloud computing from huge applications servers storage and some types of connectivity. Another hand to significantly optimizing cloud performance and reducing major problem which is power consumption. Actually, T1 advanced multi core soc provide a more specific alternative service to existing solutions as shown in Figure-8 and Figure-9. Depending on T1 scaling key element framework their ability to high-performance ARM Cortex-A 15 core processor, T1 is the newest TMS320C66XD8P cores and the inbuilt on a packet transferring process. Finally which has been providing features more specifications and efficient performance and easily reduce data centre and cloud energy consumption as shown in Figure-7.

A. Maximize job performance under power consumption constraints

Exploit the performance of computing make available on personal function especially in research product improvement and education. In especially HPC which make facilitate accelerates the marketplace and make available important cost reduction and incredible flexibility [12].



B. Minimize the Whole consumption power through job performance Bondage

Lowering the highest working expenditure is a major challenge could be a cloud service by providers [13].

6. CONCLUSIONS

Typically the cloud service organizers to make a complex cloud data centers efficiently along with the higher resource facilities but which demands major quantity of power being generated from cloud computing aspects regarding result and total resources which consumed a lot of energy. Particularly energy could be accumulate and reduces the number of unused resources regarding must assure the essential requirement of workload especially that we must turn off also place within little power approach if resources are not required. In this paper, we target on the comprehensively optimized way of arrangements of virtual machines for the sake of to reduce the cost. In the digital worlds which are countless techniques and several algorithms particularly used to reduce the consumption issue especially power and energy in the cloud. Few major techniques similar to dynamic voltage and frequency scaling, virtual machine migration plus virtual machine consolidation is done.

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