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A Review on Resource Scheduling and Virtualized Security Framework for Green Cloud Computing

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Abstract: Cloud computing provides computing power and resources as a service to users across the globe. This scheme was introduced as a means to an end for customers worldwide, providing high performance at a cheaper cost when compared to dedicated high- performance computing machines. This provision requires huge data- centers to be tightly coupled with the system, the increasing use of which yields heavy consumption of energy and huge emission of carbon dioxide. The importance of green cloud computing has been generated

Keywords: Green cloud computing, carbon dioxide emission, Energy Efficiency

I. INTRODUCTION

Cloud is the metaphor for the Internet, based on how it is depicted in computer network and is an abstraction for complex infrastructures. Cloud computing[1] is an evolving paradigm which is enabling outsourcing of all IT needs such as storage, computation and software through large internet. The shift towards such service-oriented computing is driven primarily by ease of management and administration process involving software upgrades and bug fixes .It allows fast application developments and testing for small IT companies that cannot afford large investment on architecture. Most important aspect of cloud computing is economy of scale, i.e. cost per user and server utilization. So the basic principle of cloud computing is to make the computing be assigned in a great number of distributed computers rather than local computer or remote server. Its foreground is to provide secure, quick, convenient data storage and net computing service centered by Internet. Cloud computing [2] is a collection of variety of computing concepts in which thousands of computers communicate in real-time to provide a seamless experience to the user, as if he/she is using a single huge resource. This system provides multiple facilities like –web data stores, huge computing resources, data processing servers, etc. Cloud computing can be considered as a hierarchy of concepts, which comprises of several models. The first model is the Service Model, which further includes three models namely-Software as a Service, Platform as a service and infrastructure as a service . Second is the deployment model which further comprises of public cloud, private cloud , community cloud and hybrid cloud.

A. Service Models Of Cloud Computing

Cloud Computing is mainly composed of three layers which cover all the computing stack of a system. Each of these layers[3] offers different set of services to the end users as described in Figure1.At lowest layer, Cloud offerings are named as ***Infrastructure-as-a-Service (IaaS)*** which consists of virtual machines or physical machines, storage, and clusters. The infrastructure in general is managed by an upper management layer that guarantees runtime environment customization, application isolation accounting and quality of service .The virtualization tools, such as, hypervisors, also sit in this layer to manage the resource pool and to partition physical infrastructure in the form of customized virtual machines. IaaS gives access to physical resources with some software configuration.

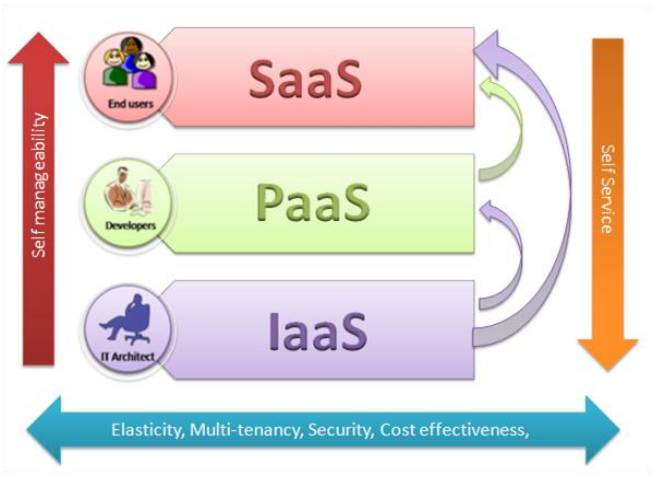

Figure: 1 Service Model of Cloud Computing

These services also constitute another layer called as a ***Platform –as- a- Service (PaaS),*** offering cloud users a development platform to build their applications. Google App Engine, Aneka, and Microsoft Azure are some of the most prominent example of PaaS Clouds. In general, Paas includes the lower layer (IaaS) as well that is bundled with the offered service. In general, pure PaaS offers the user level middleware, which allows development and deployment of applications on any cloud infrastructure. On topmost layer, the cloud services are referred to as ***Software As A Service (SaaS)*** which is a software delivery model providing on-demand access to applications. The most common examples of such service are CRM and ERPF applications that are commonly used in almost all the enterprises from small, to large business. Multi-tenancy is

another core feature of SaaS, allowing providers to outsource the effort of managing large hardware infrastructure, maintaining and upgrading applications, and optimizing resources by sharing the costs among the large user base. Therefore, the SaaS model is for the companies who get access to softwares configured according to their specific needs and shared between multiple users.

B. Deployment Models:

Cloud deployments are mainly classified into three types: Public Cloud, Private Cloud and Hybrid Cloud (Figure 2).

a. ***Public Cloud:*** Public cloud is the most common deployment model where services are available to anyone on Internet. To support thousand of public domain users, datacenters built by public cloud providers are quite large comprising of thousands of servers with high speed network. Some of the famous public clouds are Amazon Web Services(AWS),Google App Engine, and Microsoft Azure. In this deployment, cloud services are made available to the public in a pay-as-you-go manner. The fundamental characteristic of public cloud is its multi-tenancy which is essentially achieved using sophisticated virtualization at various level of the software stack.

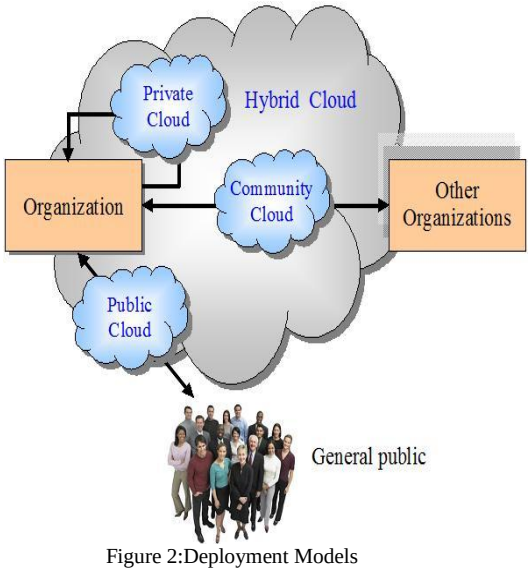

Figure 2:Deployment Models

b. ***Private Cloud:***

Private clouds are deployed within the premise of an organization to provide IT services to its internal users. The private cloud services offer great control over the infrastructure, and service resilience because its access is restricted to one or few organizations.

c. ***Hybrid Cloud:***

Hybrid Cloud is the deployment which emerged due to diffusion of both public and private Clouds advantages. In this model, organizations outsource non-critical information while keeping critical services and data in their control. The hybrid cloud, in general, applies to services related to IT infrastructure for maintaining sensitive information within the premises, and whenever require auto-scaling their resources using public clouds. The hybrid cloud, in general, applies to services related to IT infrastructure rather than software services.

II. GREEN COMPUTING

Global warming has been a big concern of late, with high power consumption and carbon dioxide emission acting as a catalyst to increase the same. With the continuously increasing popularity and usage of cloud computing and the increasing awareness of the people across the globe towards the use of eco-friendly resources has forced the researchers to devise concepts towards an eco-friendly energy efficient flavor of cloud computing called Green Computing [1].Green Cloud Computing facilitates the reduction of power consumption and carbon dioxide emission along with the reutilization of energy in an efficient way.

The word “green” means eco-friendly. Green computing [4] is defined as the study and practice of using computing resources efficiently through a methodology that combines reducing hazardous materials, maximizing energy efficiency during the product’s lifetime, and recycling older technologies and defunct products. Green Computing enables companies to meet business demands for cost-effective, energy-efficient, flexible, secure and stable solutions while being environmentally responsible. Green Cloud Computing is envisioned to achieve not only efficient processing and utilization of computing infrastructure, but also minimize the energy consumption.

A. Green Computing and Virtualization

The key driver technology for energy efficient clouds is “Virtualization” [3] which allows significant improvement in energy efficiency of cloud providers by leveraging the economies of scale associated with large number of organizations sharing the same infrastructure. Virtualization [5] based cloud computing platforms are becoming very popular that provides a new supplement, consumption and delivery model for network software application over the Internet. Virtualization (Figure 3) refers to the abstraction of computer resources or processes of two or more operating systems on a single hardware machine. A cloud is a pool of virtualized computer resources. Virtualization consists of a system admin to combine physical systems into VM in maximally energy efficient manner. That is necessarily in green cloud computing point of view to less power consumption. Virtualization assists in workload distribution

and management. Virtualization is critical to cloud computing. It simplifies the delivery of services by providing a platform for optimizing complex IT resources in a scalable manner. That makes cloud computing so *cost effective*. In cloud computing, it needs to support many different operating environments, to manage the various aspects of virtualization in cloud computing most companies use *hypervisors*. The hypervisor is a software component which controls access to the physical hardware. It may run on the top of a host operating system ,allowing other operating systems to run within the host OS and so on the same physical hardware virtualized quickly and efficiently.

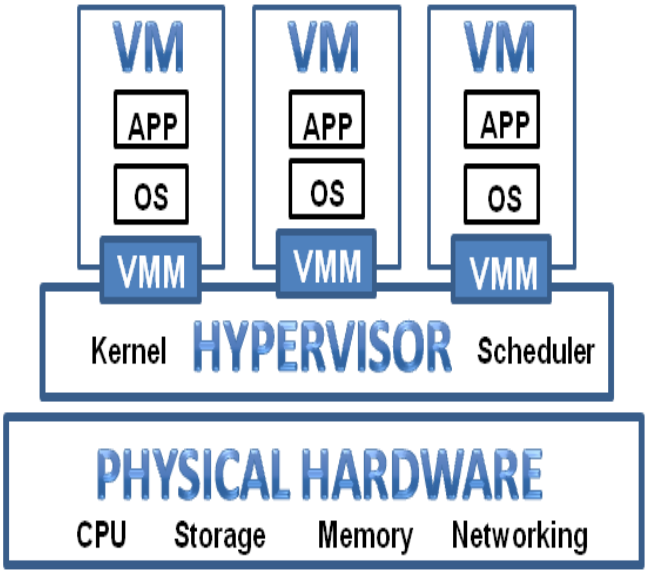

Figure 3: Virtualization

How virtualization works in green cloud computing?

Virtualization can be used to reduce power consumption by data centers. The main purpose of virtualization is that to make the most efficient use of available system resources, including energy. A data center installing virtual infrastructure allows several operating systems and applications to run on a lesser number of servers , it can help to reduce the overall energy used for the data center and the energy consumed for its cooling. Some of the advantage s of virtualization which directly impacts efficiency and contributes to the environment include :Workload Balancing across servers, resource allocation and sharing are better monitored and managed and the server utilization Rates can be increased upto 80%. The energy saved per server would be near about 7000 KWH per year. It means that there would be a large saving of energy , hence virtualization is the best practice for Green Cloud Computing especially in the developing countries like India where power saving is the today's need. Virtualization is the process of presenting a logical grouping or subset of computing resources so that they can be accessed in ways that give benefits over the original configuration.

III. RESOURCE SCHEDULING

Resource Scheduling [6] schedules the resources on the basis of energy based resource scheduling algorithm. First of all cloud consumer will try to access the cloud resources for the execution of the cloud applications through a cloud portal. A certificate will be produced, and the authentication and authorization would be accomplished through the Cloud Security Infrastructure.CSI Security will communicate with the broker. Broker will gather the information about the resources and Cloud workload status. Cloud Computing resources (Figure 4) are characteristically functioned under the control of an Energy Consumption center which implements allocation and prioritization policies while optimizing the execution of all submitted cloud workloads for efficiency and performance. An SLA Agreement is a official document to describe the QoS parameter (energy) in written form. Resource Manager will take the information about the algorithm which is stored in the Cloud Workload Scheduler.

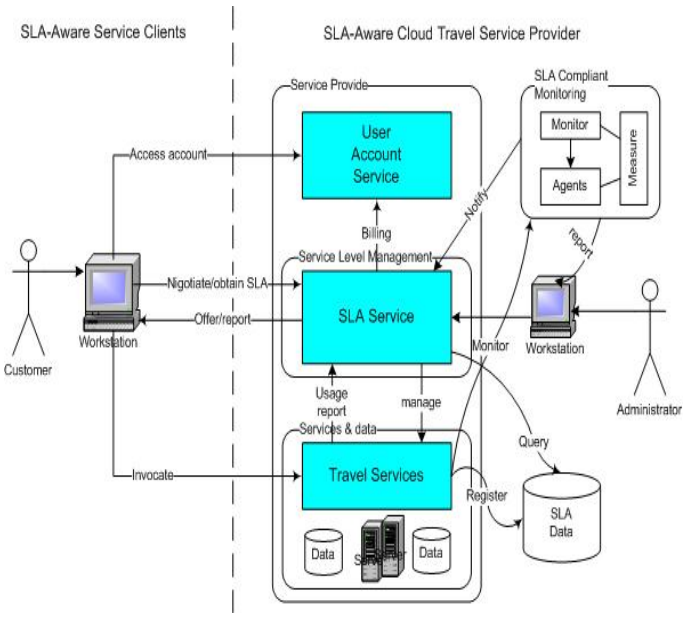

Figure 4: A resource Scheduling Framework

The Cloud Workload Scheduler contains the workload documents and programmatic interface for instantiating scheduling constraints. Resource Scheduler is a logical entity that makes scheduling decisions for it or for other network elements that demand such choices. Resource Manager is a logical entity that applies scheduling decisions according to cloud consumer's requirements. Resource Manager checks for availability of the resources according to scheduling conditions and then schedule the resource to cloud consumer's application and after that the scheduler will do the scheduling. Local Resource Manager handles operations such as resource allocation, configuration and advance booking, etc. Consequently getting the result, it is redirected back to the cloud consumer. Service Analyzer interprets and examines the service requirements of a request before deciding whether to receive or reject it .Cloud Workload Manager allocates requests to resources and concludes resource rights for allocated resources. It consistently chooses when resources are to be added or removed to meet customer requirements. Resource Manager retains track of the availability of resources and their resource rights.

IV. CONCLUSION

The benefits are analyzed which are offered by cloud computing by studying its fundamental definitions and benefits, the services it offers to end users, and its deployment model. Then, we discussed the components of. clouds that contribute to carbon emission and features of cloud that make it "green". Several unexplored areas are identified that can help in maximizing energy efficiency of clouds from a holistic perspective. After analyzing the shortcoming of previous solutions, a Green Cloud Framework has been proposed. This paper gives an overview of cloud computing service and results are presented. In conclusion, by simply improving the efficiency of the equipment, Cloud Computing cannot be claimed to be green. What is important is to make its usage more carbon efficient both from user and provider's perspective..

V. REFERENCES

[1]. Poulami Dalapati, G. Sahoo, "Green Solution for Cloud Computing with Load Balancing and Power Consumption Management". International Journal Of Emerging Technology and Advanced Engineering (ISSN: 2250-2459, Volume3, Issue3 (March 2013).

[2]. Ankita Atrey, Nikita Jain "A Study On Green Cloud Computing". International Journal Of Grid and Distributed Computing ". Vol.6,2013

[3]. Saurabh Kumar Garg, Rajkumar Buyya, "Green Cloud Computing and Environmental Sustainability". Cloud Computing and Distributed Systems(CLOUDS) Laboratory,2012

[4]. Yuvapriya Ponnuswamy,S. Sasikumar , " Application of Green Cloud Computing for efficient resource energy management in data centers". International Journal of Computer Science and Information Technologies. (ISSN :0975-9646,Volume 3(5), 2012.

[5]. Anup R. Nimje, Prof. V.T. Gaikwad, Prof. H.N. Datir,"Green Cloud Computing: A Virtualized Security Framework for Green Cloud Computing ". International Journal of Advanced Research In computer Science And Software Engineering , Vol-3, Iss-4, April 2013.

[6]. Sukhpal Singh and Inderveer Chana, " Energy based efficient resource scheduling: A Step Towards Green Computing" International Journal Of Energy, Information and Communications"Vol-5. Issue-2, 2014.

Short Bio Data for the Authors

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