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RESEARCH ARTICLE

Energy Efficiency in Green Computing using Linear Power Model

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Abstract: Cloud computing is basically defined as an "On Demand" service in which resources can be shared as per the need over the internet. In this present time, every business is heading itself to use cloud computing as it requires minimal management efforts. Due to this, the need to have more servers is increasing rapidly. More are the servers, more is the energy consumed by them. So to make cloud computing more efficient in terms of energy consumption, the term Green Computing is used. Green Computing is basically responsible to use the computer and its related resources in an environment friendly way. In this paper we have proposed a technique with Linear power model using four different schedulers to save energy.

I. INTRODUCTION

Cloud computing is a technology that is issued for hosting and delivering services over the Internet. It is generally defined as a model that provides a convenient, on-demand network access to the shared computing resources so that they can be rapidly provisioned and released with minimal management effort or service provider interaction. [7]

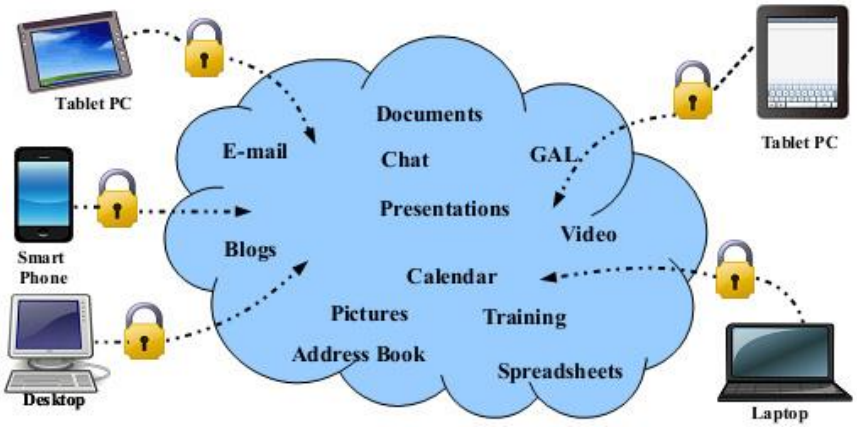

Figure 1: Cloud Computing [7]

The demands of cloud computing is not only limited to large enterprises but also to the start-ups, entrepreneurs and medium companies. They will have a new alternative that would save millions of dollars with cloud computing as they will have the option to only provide the necessary storage space, computing power and communication capacity from the large cloud computing provider. In general, cloud service provider's offers services that are grouped into three categories: platform as a service, infrastructure as a service and software as a service and. [12]

In Present time every business is upgrading from traditional to online which results in increasing the demand for servers for Cloud Computing. With the fast development of cloud computing, the number of servers required is increasing rapidly and therefore consumes more energy. Even an Ideal server consumes 70% of its peak power which results in major energy inefficiency. The CO2 emission from these DCs is so large that it is contributing to global warming. [2]

To reduce the power consumption here the term green computing is used. Green computing is the study and practice of environmentally sustainable computing that includes e-waste management so as to reduce resource use. It is generally responsible to use the computers and related resources in an eco-friendly way. [6]

Cloud computing can be made more energy efficient by using technologies like workload consolidation and resource virtualization. Cloud datacenter can reduce the energy consumed by server consolidation whereby different workloads can share same physical host with the concept of virtualization and the unused servers can be switched off in order to save energy. [13]

II. RELATED WORK

Various approaches used for green computing are as given below.

LookAhead control

As per the author Dara Kusic, the data centre operators can maintain the required higher server utilization, quality-of-service (QoS) and energy efficiency by maintaining the workload ,dynamically provisioning the virtual machines and turning servers on and off as when required. The author basically proposed a dynamic resource provisioning framework that can basically work in virtualized server environments where the provisioning problem is solved using a lookahead control scheme. The proposed approach is mainly used for the switching costs incurred while working with virtual machines and also covers the corresponding risk in the optimization problem [10]

Hypervisor technology

Farzad Sabahi, the author states that in Cloud computing, virtualization technique has many security issues and limited security capabilities that must be viewed before cloud technology is affected. The author proposed new security architecture in a hypervisor-based virtualization technology in order to secure the cloud environment. [2] A hypervisor is firmware or software that aims in providing a virtual machine for direct access on underlying hardware but within some constrained.

A Live Migration of Virtual Machine Based on the Dynamic Threshold at Cloud Data Centres

The author Girish Metkar says that Cloud computing has now days changed the whole picture of computing in almost every field. Virtualization being the basic key technology that commonly used in cloud computing. With Virtualization we can divide one physical machine into multiple other virtual machines. "A Live migration of virtual machine" is one of the important features of the virtualization. Proper technique for virtual machine

migration should be used by the administrator to move the virtual machine from one physical machine to another. Migration is mainly used for the hot spot management, load balancing, resource consolidation and fault tolerance. This proposed technique is basically used to lower the energy consumption of data centres. It also uses a lower and upper level threshold that can limit the number of migration involved. [11]

Integrated Green Cloud Computing Architecture

In order to save energy, minimize operation cost and to maintain an eco-friendly environment, Mohammad NaiimHulkury proposed an Integrated Green Cloud Architecture (IGCA) that consists of a client oriented Green Cloud Middleware to assist managers in a better overseeing and configuring their overall access to cloud services in the most energy-efficient way. Decision on whether to use local machine, public or private clouds is decided smartly by the middleware using predefined system specifications such as job description, equipment specifications, service level agreement (SLA), and Quality of service (QoS) and provided by the IT department. [9]

III. PROPOSED WORK

Some tools are developed by different researchers such as Green cloud simulator developed by Luxembourg University and Cloudsim simulator by Melbourne University. I will use the greencloud simulator which is extended from the network simulator (NS2). The simulator compile two languages C++ and tcl with core code written in C++ and the tool command language supports the frontend and moreover it creates traces of the simulation which include the parameters involved in it. The green cloud simulator supports in testing various fields related to current market of cloud computing which focus on consuming minimum energy by their infrastructure for the task requested by users. The green cloud supports IaaS simulation environment which help in implementing various working pattern in cloud computing. This helps is improving current policies so that the operational cost of the real environment can be reduced thereby enhancing the margin of profit to service providers.

We will do the evaluation of green cloud on the basis of the linear power model. In the Linear power models we will use four different scheduling algorithms the Green scheduler, Green scheduler using virtual machines, Round-Robin scheduling using host and Round Robin using virtual machines. From the simulator we can select which algorithm we have to use at a particular instance. The number of servers and switches can be customized and the numbers of users are fixed.

IV. RESULTS AND DISCUSSION

For the results, we worked on energy conservation in green cloud simulator with 144 servers 10 cloud users.

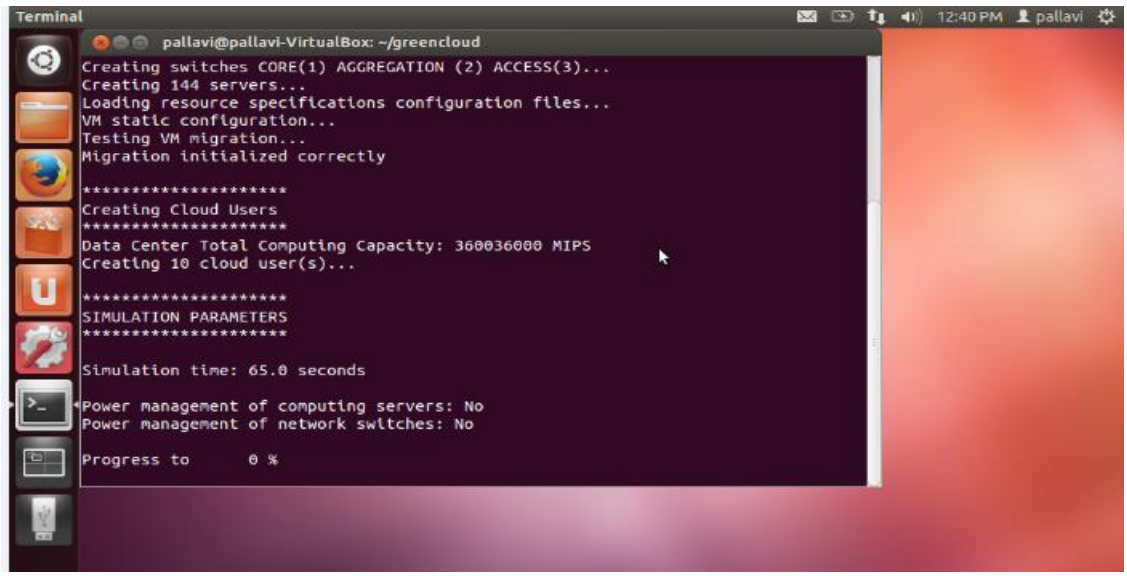

Figure 2: Code execution

Results are compared for various types of schedulers (Round robin host agent, Round robin VM agent, Schedule green and Schedule green VM only) with\without power model.

The units of energy are W*h.

Table 1: Comparison for Total energy

Type of scheduler	**WITHOUT POWER MODEL**	**WITH POWER MODEL**
Round-Robin scheduling using host	776.1	221.3
Round Robin using virtual machines	838.7	236
Green scheduler	774.1	220.8
Green scheduler using virtual machines	834.3	235

The Table 1: shows the comparison between the various schedulers on the bases of the total energy consumed. The comparison is done with and without the power model.

Table 2: Comparison for Server energy

Type of scheduler	**WITHOUT POWER MODEL**	**WITH POWER MODEL**
Round-Robin scheduling using host	614.1	59.3
Round Robin using virtual machines	676.7	74.0
Green scheduler	612.1	58.8
Green scheduler using virtual machines	672.3	73.0

The Table 2: shows the comparison between the various schedulers on the bases of the server energy consumed. The comparison is done with and without the power model.

The graphical comparison of the total energy consumed and server energy consumed is shown below.

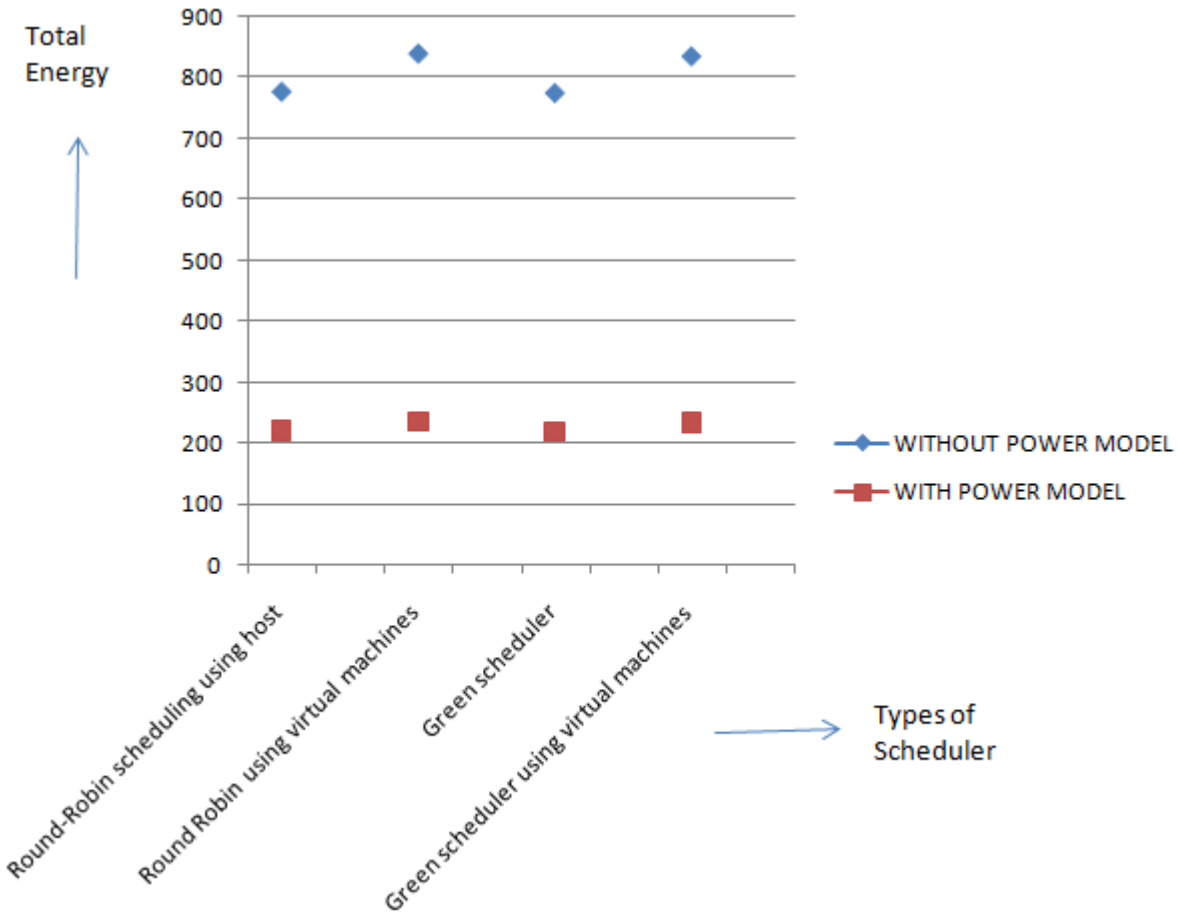

Figure 3: Comparison for Total energy

The Figure 3 represents the total energy consumed with and wothout power model with the four different schedulers. The values highlighted with blue indicates the total energy consumed without power mode. The values highlighted with red indicates the total energy consumed with power model.

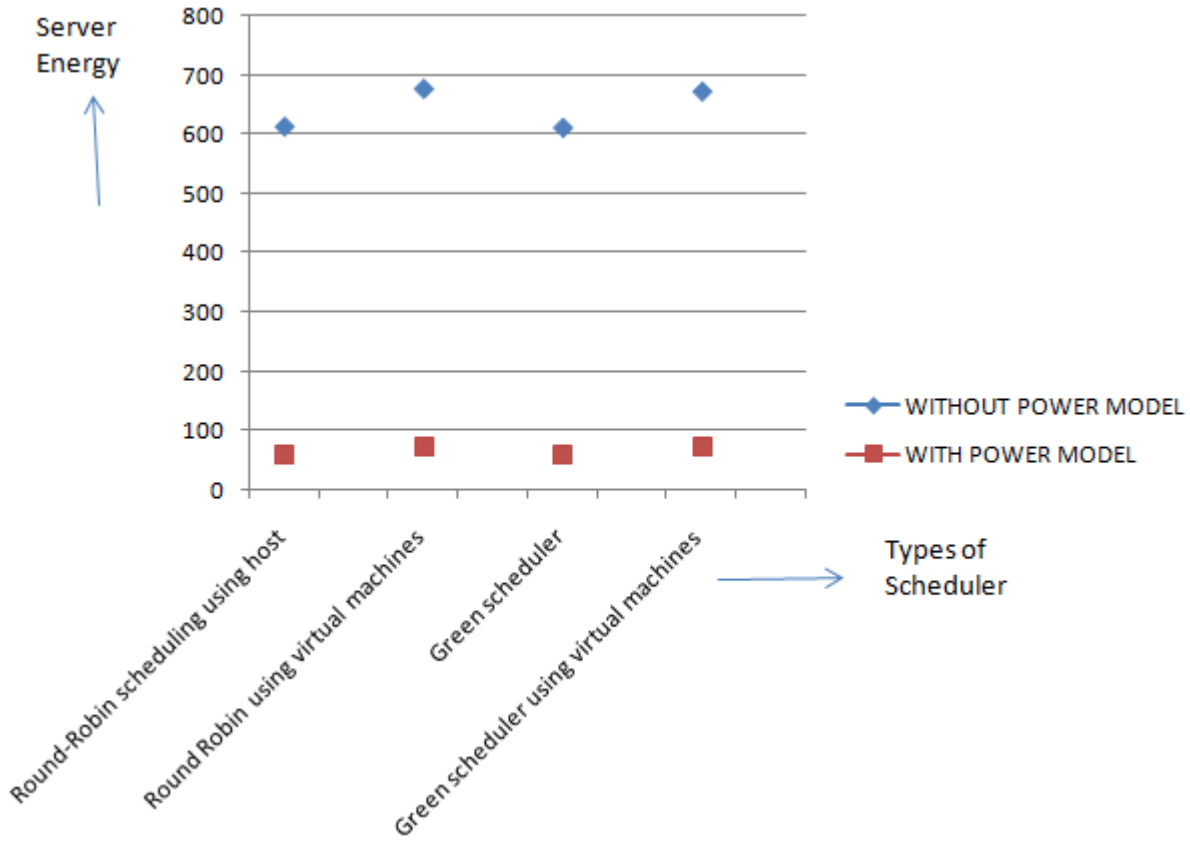

Figure 4: Comparison for Server energy

The Figure 4 represents the server energy consumed with and without power model with the four different schedulers. The values highlighted with blue indicates the server energy consumed without power mode. The values highlighted with red indicates the server energy consumed with power model.

V. CONCLUSIONS

In this paper a new energy conservation technique is proposed using Linear power model.From the results, it can be concluded that Green scheduler works most efficiently with and without the power model. The total energy and the server energy consumed by the Green scheduler is less than any other scheduler.

REFERENCES

[1] Shalabh Agarwal, Arnab Datta and Asoke Nath,"Impact of green computing in IT industry to make eco-friendly environment", Journal of Global Research in Computer Science , Volume 5, No. 4, pages 5-10, April 2014

[2] Farzad Sabahi, "Secure Virtualization for Cloud Environment Using Hypervisor-based Technology", International Journal of Machine Learning and Computing, Vol. 2, No. 1, Pages 39-45, February 2012

[3] Shalu Sraw, Gurpreet Singh, Amanpreet Kaur, "A Survey of Multicast Routing Protocols in MANETS", in the proceedings of International Conference on Futuristic Trends in Engineering & Management 2014 (ICFTEM-2014), Pages 220-224, 3-4 May 2014.

[4] Pushtikant Malviya and Shailendra Singh, "A Study about Green Computing", International Journal of Advanced Research in Computer Science and Software Engineering International Journal of Advanced Research in Computer Science and Software Engineering, Volume3, Issue 6, Pages 790-794, June 2013

[5] S C Rachana, Dr. H S Guru Prasad, "Emerging Security Issues and Challenges in Cloud Computing", International Journal of Engineering Science and Innovative Technology, Volume 3, Issue 2,Pages 485-490, March 2014

[6] Mr. Anup R. Nimje, Prof. V. T. Gaikwad and 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, Volume 3, Issue 4, pages 642-646, April 2013

[7] Gaganpreet Kaur Sehdev, "Rudiments of Cloud to Green Cloud: Smartness in Power Redeeming", International Journal of Science and Research, Volume 3, Issue 3, Pages 216- 221, March 2014

[8] Anuj Prasher, Rajkumari Bhatia, "A Review On Energy Efficient Cloud Computing Algorithms, "International Journal of Application or Innovation in Engineering & Management, Volume 3, Issue 4, Pages 364-368, April 2014

[9] Mohammad NaiimHulkury, "Integrated Green Cloud Computing Architecture", in the proceedings of international conference on advanced computer science applications and technologies, pages 269-274, 2012

[10] Dara Kusic, "Power and Performance Management of Virtualized Computing Environments Via Lookahead Control" , International Conference on Automonic Computing, pages 3-12, 2008

[11] Girish Metkar , " A Live Migration of Virtual Machine Based on the Dynamic Threshold at Cloud Data Centres",International Journal of Advanced Research in Computer Science and Software Engineering, Volume 3, Issue 10,Pages 401-405, October 2013

[12] Pradeep Kumar Tiwari, "Cloud Computing Security Issues, Challenges and Solution", International Journal of Emerging Technology and Advanced Engineering, Volume 2, Issue 8, August 2012)

[13] Kalange Pooja R, "Applications of Green Cloud Computing in Energy Efficiency and Environmental Sustainability", IOSR Journal of Computer Engineering, Pages 25-33, 2012

[14] Pallavi Mohindru, Amanpreet Kaur, "A Review on: Energy Efficiency in Green Computing", International Journal of Advanced Research in Computer Science and Software Engineering, Volume 5, Issue 4, pages 860-864, April 2015.

