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Efficient Energy Utilization In cloud

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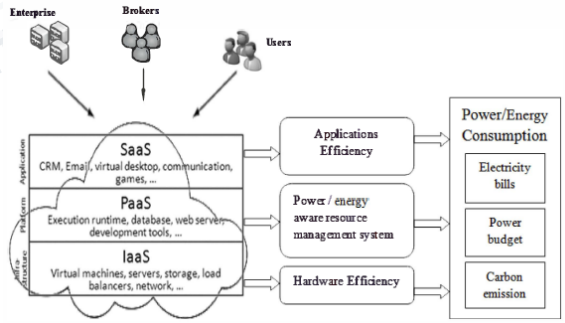
***Abstract* - Nowadays there is rapid increase in the usage of cloud computing resources. Because it offers utility oriented services to the users. i.e. it provides the users pay – per – use computing devices. There is the requirement of high performance cloud computing in every field such as business and web applications. Due to this there is great demand for powerful data centers. These data centers consume enormous amount of energy for data processing, storage and communication. The prime of energy consumption in cloud computing is by means of computational devices, server computational devices, network computational devices. The efficient power management is needed to lower the unnecessary consumption of power. This paper aims at using the energy efficiently.**

Keywords : Cloud Computing, Energy Efficiency, Energy Utilization.

I. INTRODUCTION

A cloud computing is a computing model since it enables resources to be provisioned efficiently on demand. Cloud computing is a model for enabling convenient on – demand network access to shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction. Still there are various definitions of cloud computing [1]. There are several deployment models [2][8] and service models [3][8] of cloud computing. Deployment models such as hybrid cloud, public cloud, private cloud and community cloud. Service models such as infrastructure as service, platform as a service and software as a service. Cloud computing has five essential characteristics [4][8] – on-demand self-service, broad network access, resource pooling, rapid elasticity, measured service. The major benefits [5] of cloud computing are flexibility, efficiency, strategic value. There are several challenges that are faced by cloud computing[5][8] – Security, lack of resources, migration, vendor lock-in, governance etc.. As there is greater need for cloud computing in every field energy efficiency in cloud computing is becoming a very important issue. This paper focuses on the efficient utilization of energy. Energy utilization focuses on the technologies that can lead to new and potentially more efficient ways of using electricity in residential, commercial and industrial settings. The figure shows the scenarios in which system may lose or waste energy. To make use of energy efficiently there are several energy efficient cloud computing algorithms – Exact VM allocation algorithm, Exact VM migration algorithm etc. [6]. And there are several metrics used to measure the power consumption in cloud computing such as – PUE, DCiE, GEC etc. [7]. Carbon dioxide and other global warming pollutants are collecting in the atmosphere causing the planet to warm up. Among all sources, information technology industry is highly responsible for a large portion of the world-wide growth in energy consumption caused by thousands of working datacenters and computing systems all over the world results in increasing energy consumption as shown in the figure.



The following diagram shows the processing of the energy utilization and efficient utilization as well as the wastage of the energy.

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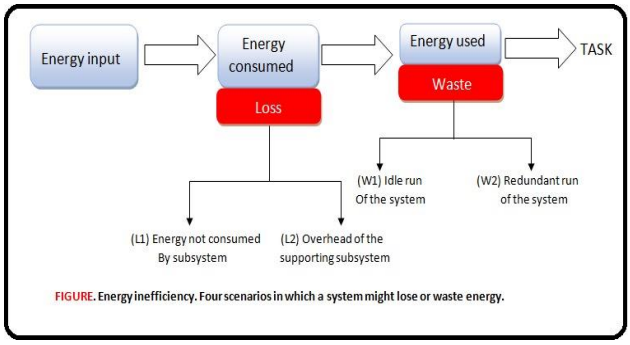


FIGURE. Energy inefficiency. Four scenarios in which a system might lose or waste energy.

In this paper the different energy efficient algorithms and models are discussed in depth. The different ways to minimize energy in cloud computing services are also being discussed in this paper.

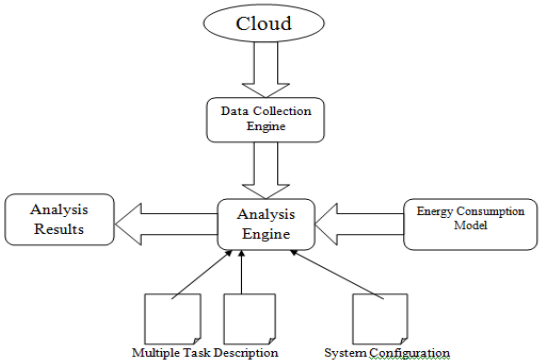
II. RELATED WORK

One of the major operating expenses of a cloud computing system is the energy cost. Thus, making the power consumption scale up and down dynamically according to the demand can potentially lower the cost of operation substantially. A simple way to decrease the power consumption is to power down the unused physical machine according to current system load. Anyway, the approach mentioned in [9] also lower the quality of service user received due to more system load congestion. The algorithm mentioned in [9] enables the power consumption of a cloud system to scale according to the level of usage. The Data centers make use of large energy. It negatively impacts on the environment. So to reduce the energy consumed by datacenters the algorithms mentioned in [10,11,12] are implemented.

Cloud Computing provides a solution to reduce the adverse environmental impacts and saves energy. There are various methods mentioned in [13] are enforced on cloud environment to make it more energy efficient. Cloud computing involves sharing computing resources located at some distant place instead of using local servers or personal devices. Cloud computing includes applications as well as hardware in data centers. There are some challenging research issues like data security, economic challenges, Data management and so on. To solve issues some of the techniques are used in [6].

Cloud applications are deployed in remote data centers where high capacity servers and storage systems are located. A fast growth of demand for clod based services results into establishment of enormous data centers consuming high amount of electrical power. Energy efficient models are required for complete infrastructure. The energy models mentioned in [14] are used to reduce functional costs. The literature survey is shown in the table 1.

III. PROPOSED MODEL



We have been developing a tool to calculate and analyze total energy consumption. Figure shows the architecture of our energy consumption analysis tool.

The core component of the tool is the Analysis Engine. It takes our energy consumption model and application task parameters as input, as well as the performance data collected from the Cloud by Data Collection Engine. The Data Collection Engine collects two kinds of data: 1) the energy consumed by each task; and 2) the value of system performance parameters, e.g. response time, CPU utilization, memory utilization, disk I/O and network throughput.

In addition, we will integrate an energy cost rate and an "energy dirtiness rate" into our energy consumption model to factor in differing environment impact of different cloud energy sources. We also plan to extend our research to the energy cost of scientific workflows that is composed of multiple types of tasks on larger scales.

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Sl.no	Author	Year	Title	Techniques/Algorithms	Advantage	Disadvantage
1	Prayook Jatesiktat, et.al.[9]	2012	Efficient Power Management On Cloud System Using Two Phases Power Convergence Algorithm (TPPC)	1.Two Phases Power Convergence Algorithm (TPPC)	1.TPPC algorithm can reduce system power consumpti--on.	1. In this system one cannot have full control balance of VCPU in each virtual machine. 2.The impact to the quality of service is still low.
2	Shaden M. A., et.al. [11]	2016	Green algorithm to Reduce the Energy consumption in Cloud Computing Data Centers	1.Novel Scheduling Algorithm	1.The algorithm propsed here exploits the heterogini--ty of servers that reduce energy consumption	1.here the server is responsible for deciding the phase of operation so during peak hours it is heavily loaded and it may be halted.
3	Shahinaz R. Hussein, et.al. [12]	2014	Green Cloud Computing: Datacenter Power Management Policies and Algorithms	1.Fuzzy Rule Based Scheduling algorithm 2.Power Aware Best Fit Decreasing Algoithms	1.This decreses the energy consumption.	1.The execution time is increased here.
4	Sobinder Singh, et.al. [6]	2016	ASurvey on Techniques to Achieve Energy Efficiency in Cloud Computing	1.Speed Step Technology 2.Request Batching Techniques	1.The energy is conserved in the cluster of servers.	1.Here the concentration is given on the battery life rather than energy consumption.
5	R. Karthikeyan [15]	2012	Novel Heuristics Energy Efficiency Approach for Data Center	1.VM migration Algorithm 2.Auto Scaling Technique 3.Novel heuristics energy efficient approach 4.Green Cloud Infrastructure 5.CloudSim Simulator	1.the methods used here leads to substantial reduction of energy in cloud data centers	1.Optimization of Network Topologies. 2.VMs Configuration constraints.

6	Yuvapriya Ponnusamy [16]	2012	Application of Green Cloud Computing for Efficient Resource Management in Data Centers	1.Power Aware VM Scheduling	1. This paper has found new way to save vast amount of energy while minimally impacting performance.	1. The Cloud techniques discussed here still need for the improvement in cloud infrastructure
7	Kepi Zhang, et.al. [17]	2017	A New Energy Efficient VM scheduling Algorithm for Cloud Computing Based on Dynamic Programming	1.VM selection algorirhm 2.Greedy Algorithm 3.Cloudsim Tool	1. The dynamic programming method used here optimize the selection of VM's to be migrated hence achieve good energy saving effect.	1. The scheduling of tasks and VM replacement is not possible here .
8	Anuj Prasher, et.al. [19]	2014	A Review on Energy Efficient Cloud Computing Algorithms	1.Exact VM allocation algorithm 2.Exact VM migration algorithm 3.Energy Aware Migration Algoritm.	1.The Algorithms mentioned here are saving the energy according to their various constraints.	1.Power capacity of the Server cannot exceed from the maximum power. 2. If the server reaches the maximum power then the VM migration does not take place.
9	Poulami Dalapati, et.al. [20]	2013	Green Solution for Cloud Computing with Load Balancing and Power Consumption Management	1.Ant Colony Based Algoritm	1.the emphasis here is scheduling the jobs for proper load balancing. 2.Putting the idle or the unused machines to sleep mode for efficient power management.	1. This approach needs the attention of the security of the cloud.
10	Vinod Kr. Saroha, et.al. [24]	2018	Energy Efficient Mechanism in Cloud Computing	1.	1. this system transfers the bulk of data over the network. 2. The cloud provides the scalable and flexible services.	1. There are some challenge with the security.

SUMMARY

The Literature survey shows that Energy consumption is an important aspect. As there is advancement in the cloud technology, The data centers, computing devices, serves consume lot of energy. The literature survey shows there are techniques that can reduce the energy consumption, and some papers tell minimization of the unused systems, some papers shows the techniques to avoid the wastage of the energy. Now way days green computing is trending technology that reduces the energy consumption as well as controls the carbon di-oxide emission. We also come to know that there are some issues with the security of the data.

REFERENCES

1. Luis. M. Vaquero"A break in the clouds : Towards Cloud Defintion", ACM SIGCOMM Computer Communication Review, vol.39, no.1, jan 2009.

2. M. Nazir, "cloud computing : overview and current research challenges", in IOSR journal of computer engineering, vol.8,issue-1, dec-2012.

3. M. U.Bokhari, Q.M.Shallal, Y.K.Tamandani, "cloud computing service models : A comparative study", in 2016 International conference on computing for sustainable global Development (INDIAcom), 2016.

4. M.N.Birje, P.S.Challagidad, et.al "Security issues and counter measures in cloud computing", International journal of applied engineering research, 2015

5. Colin Ting Si Xue, Felicia Tiong Wee Xin "Benefits and challenges of the adaption of cloud computing in business", International Journal on Cloud Computing: Serveices and Architecture", vol.6, no.6, dec 2016.

6. Sobinder singh, et.al. "A survey on techniques to achieve energy efficiency in cloud computing", International Conference on Cloud, Communication and Automation, 2016.

7. Arindam Banerjee, et.al. "Energy Efficiency Model for Cloud Computing", international Journal of Energy, Information and Communications, vol.4, issue.6, in 2013.

8. P.S.Challagidad, et.al. "Cloud computing review : Concepts, technology, challenges and security", International Journal of Cloud Computing, vol.6, no.1, in 2017.

9. Prayok Jatesiktat, Putchong Uthayopas, "Efficient power management on A Cloud System Using Two Phases Power Convergence Algorithm", Ninth International Joint Conference Computer Science and Software Engineering, 2012.

10. Karuppasamy M, et.al. "Energy Efficient Utilization of Cloud Resources Using Hybrid Ant Colony Genetic Algorithm for sustainable green cloud environment", international Conference on Intelligent computing and control, 2017.

11. Shaden M. AlIsmail, Heba A. Kurdi, "Green Algorithm to Reduce the Energy Consumption in Cloud Computing Data Centers", July 2016

12. Shahinaz R. Hussein, et.al. "Green Cloud Computing: Datacenter Poer Management Policies and Algorithms", 2014.

13. Nimisha Joy, "A Study On Energ Efficient Cloud Computing", 2015.

14. Arindan Banrjee, et.al. "Energy Efficiency Model for Cloud Computing", International Journal of Energy, Information and Communication, 2013.

15. R. Karthikeyan, et.al. "Novel Heuristics Energy Efficiency Approach for Data center", IEEE international conference on Advanced Communication Control and Computing Technologies, 2012.

16. Yuvapriya Ponnusamy, et.al. "Application of Green Cloud Computing for efficient Resource Energy Management in Data centers", International Journal of

Computer Science and Information Technologies, vol.3, 2012.

17. Kepi Zangh, et.al. "A New Energy Efficient VM Scheduling Algorithm foe Cloud Computing Based on Dynamic Programming", IEEE 4th International Conference on Cyber Security and Cloud Computing, 2017.

18. Valliyammi C., et.al. " Efficient Enegry Consumption in Green Cloud ",International Conference on Recent Trends in Information Technology, 2014.

19. Anuj Prasher, et.al. "A review on energy efficient cloud computing algorithms", International Journal of Application or Innovative in Engineering And Management, vol.3, April 2014.

20. Poulami Dalapathi, et.al. "Green Solution for Cloud Computing with Load Balancing and Power Consumption Management", International Journal of Emerging Technology and Advanced Engineering, vol.3, march 2013.