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# Green Scheduler in Cloud Computing

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**Abstract**

Cloud computing is a key component of today's IT industry. Cloud computing allows a large number of people to access a range of resources through the internet. Cloud storage offers a low-budget, user-friendly environment that preoccupies little capacities thanks to virtualization. Many task scheduling algorithms are used to control virtual machines to ensure that the least amount of energy is consumed.The subject of this project is considering the scope of green cloud computing and also the way it replaces the IT sector by energy usage, VM average load,data centerload and task distribution. The project is basically carried out with the support of a green cloud simulator and various algorithms.

**Keywords:** green cloud simulator, data centers, energy efficiency.

## I. Introduction

Companies use cloud infrastructure to provide computing requirements as a service to various types of societies. It's a forum for virtualized computing. Cloud computing allows applications from various areas, such as consumer, science, and enterprise, to be hosted. Data centres hosting cloud storage services, on the other hand, consume a lot of

resources, resulting in high running costs and carbon footprints. According to a 2007 Gartner study, the IT industry contributes 2% of global CO2 (carbon dioxide) emissions. Several thousand data centers make up the cloud, allowing it to meet consumer demand online and available at the short span. Considering the data center's size, it varies from a few hundred to several thousand square feet. Executing these server farms, as well as cooling fans for processors,network peripherals, consoles, displays, lighting and cooling systems, necessitates a large amount of electricity. In 2012, the overall power usage of these data centers was about 38 Giga Watt (GW), which, if properly used, the energy required for residential households in the United Kingdom could have met. This represents a 63 percent increase over the power consumption in 2011. In 2013, it is expected to be around 43 GW, necessitating the use of Green Cloud Computing.

## II. Related study

1. **Yashi Goyalf, et al. [2]** Cloud computing is an energy-intensive technology that allows data centers to operate hundreds of hosts. Energy use is very high because it is available 24 hours a day, seven days a week. This necessitates the investigation of various techniques for reducing cloud energy

consumption and the creation of an algorithm to do so. As a result, energy-efficient cloud computing techniques and energy-efficient hybrid techniques to reduce cloud computing energy usage are proposed.

2. **Nitesh N Naik, et al. [3]** This paper demonstrates the significance of cloud OS, also regarded as the virtual distributed operating system, which links the cloud resources in a centralized processing environment. This aids in the control of cloud resources in a versatile and open manner, thus improving system performance. Inorder to sustain the cloud services, a variety of cloud operating systems are available. **3.Fatima Shakeel, et al. [4]**

Performance enhancement has always been

desired, but the ever-increasing energy/power usage of computing devices, as well as the emission of carbon dioxide into the atmosphere, have restricted this enhancement. As a result, optimizing the power consumption of such systems is critical. We must make cloud computing energy efficient, given that it is the subject of this study.

4. **Saleh Atiewi, et al. [6]** In recent years, to help cloud computing researchers examine the cloud computing system, the simulation tools are developed. Cloud Sim and Green Cloud are two common cloud simulators that will be introduced and compared in this paper. These two simulators include scenarios for cloud computing-assisted use, server cargo, Virtualization and energy consumption.

5. **G. Rubyga, et al. [7]** The need to enhance cloud efficiency has arisen as a result of computational offloading and increased demand for timely and effective responses for real-time applications. Furthermore, the huge rise in data and demands has necessitated the building of a vast number of data centers around the world.

## III. Proposed Approach

### 1. Algorithms

Scheduling Algorithm- This is a programme that uses well-defined rules to decide the best positions for a new machine to be allocated. The input phase, policies, and the final phase are the three phases of the process.

### *A. Green Scheduler*

When the load increases, the servers will be switched on, and as the load decreases, the servers will be turned off, resulting in only the servers that are in use being turned on, reducing power usage and data center load. The server's capability should never be exceeded.

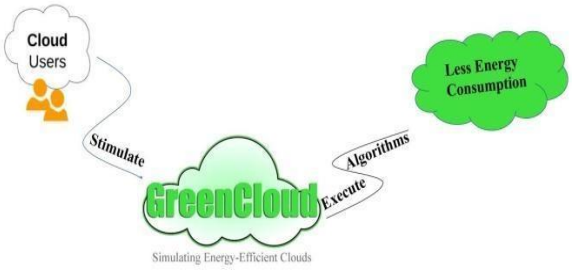


**Fig 1. Green Cloud Architecture**

### *B. Round Robin*

The Round Robin Scheduling is a load balancing algorithm that aims to maintain equal workloads across all available Virtual Machines (VMs).

### *C. DENS-Data Centre-Energy-Efficient Network-Aware Scheduling Algorithm*

It achieves a balance between the data centers' energy use. Aside from that, this algorithm focuses on unique job conditions and has a straightforward and straightforward architecture.

### *D. HEROS*

HEROS is a resource allocation and energy efficiency load balancing algorithm for heterogeneous systems. It also uses a holistic representation of the system and considers the heterogeneity of the system during the decision-making process. As a result, servers with multiple resource types (computing, memory, storage, and networking) have internal structure components that can be used more effectively.

## 2. Greencloud VS CloudSim

**Table 1: Comparison for Greencloud and CloudSim**

| **Features** | **Cloud Sim** | **Green Cloud** |
|---|---|---|
| **Description** | It is an open source simulator which can be used for projects which use very large clouds. | It is a simulation tool which calculates the total amount of energy consumed by a datacenter in a cloud environment. |
| **GUI** | Accessed using Cloud Analyst. | Accessed using Network Animator(NAM) simulator. |
| **Performance(Quality of Service)** | Subsidize | Subsidize |
| **Energy efficacy** | True | True |
| **Technology stack** | JAVA | C++ and TCL |
| **Obtaining results** | Data processed using Excel Because it is difficult. | HTML report with graphics (Dashboard) that is easy to use. |
| **Open source software(O SS)** | True | True |
| **Accessible on the web** | True | True |

| | | |
|---|---|---|
| **Application replicas** | Computatio n, data transfer | Datacenter computation, and deadline execution |
| **Communic ation replicas and TCP/IP support** | Little as energy calculation is limited to delay and bandwidth. | Complete as energy calculation is associated with packets,link errors,delay, bandwidth,routin g |
| **Energy replicas** | None | Data center elements servers and networks |
| **Power retrenchme nt replicas** | None | Dynamic Voltage Frequency Scaling(DVFS), dynamic network<br>shutdown (DNS) plus DVFS + DNS |

## IV. Analysis of Simulation Outcome

We know that job scheduling is one of the important criteria for reducing task execution time in data centers.Here Green cloud

simulator was used to run the simulation.Which is configured using Ubuntu version 12.04 32-bit architecture running on an Intel Core i5 processor device.A data center's configuration is shown in Table 2 below. Dynamic Voltage Frequency Scaling (DVFS) ,Dynamic Network Shutdown (DNS) are allowed on the servers.The power replicas of DVFS and DNS are linear with lowest and highest power value refused.Of the total data center capacity the load is set to 30% of it in each case.Time required for simulation is adjusted to 65.5s, datacenter is initially free.

**Table 2: Data Centre Arrangement Details**

| **Arrangement** | **Count** |
|---|---|
| Main switches | 1 |
| Assembly switches | 2 |
| Entry switches | 150 |
| Entire servers count | 300 |
| Count of virtual machines per machine | 3 |
| Mean of accepted tasks | 3,27,529 |
| Time required for Simulation | 65.5s |
| Cloud Users count | 1 |
| Data Center topology | Three-tier high speed |
| System load | 30% |

There are a total of 3,00,000M instructions, 4096 bytes of data input, and 250KB of data output, with no memory requirements present in the tasks. Figures 2–7 depict the energy

usage of servers in datacenters for various scheduling algorithms.When compared to other schedulers in terms of energy efficiency Green cloud scheduler is the best one,As it reduces the power consumption by 2 percent. Figures 6 and 7 represent the study of these algorithms in terms of energy consumption and task execution time.

The server startup and shutdown are depicted in Figures 8 and 9, respectively. The server is shut down when the cumulative energy exceeds 300, which satisfies the green scheduler algorithm.


**Fig 2. Green Scheduler**


**Fig 3. Round Robin**


**Fig 4. Random Scheduler**

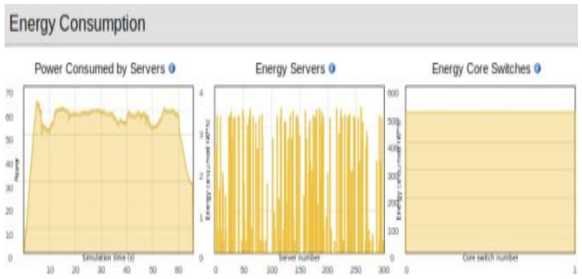


**Fig 5. HEROS Scheduler**

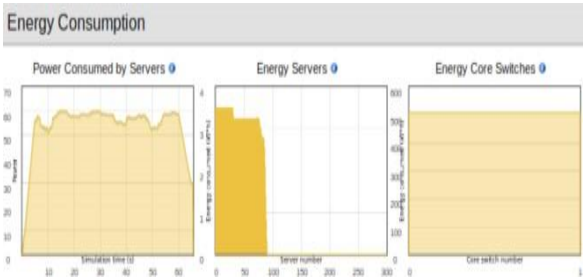


**Fig 6. Best DENS**


**Fig 7. RandDEN**

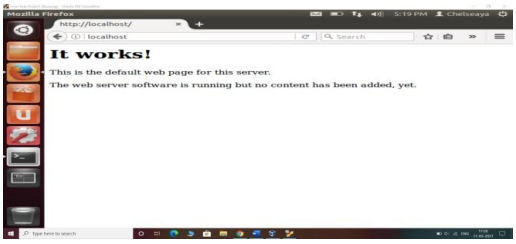


**Fig 8. Server ON**

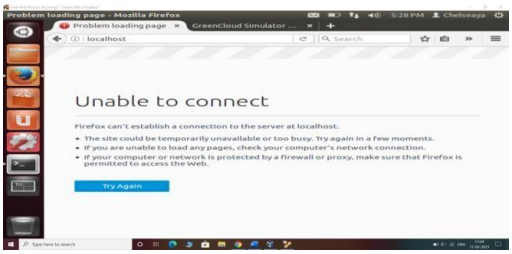


**Fig 9. Server OFF**

## V. CONCLUSION

The findings presented here are based on a simulation conducted in a homogeneous small-scale data center environment. In the case of searching all lists of machines to find the best position, the algorithm's complexity is O(n). When compared to other schedulers, the Green scheduler uses less fuel, according to the results.

## REFERENCES

1. G Jagadeeswara Rao, G. Stalin Babu, "Analysis Energy of task scheduling algorithms in the green cloud"-2017.

2. Yashi Goyal, Meenakshi S.Arya, Sunil Nagpal, "Energy efficiency with the help of hybrid policy in green cloud computing", International Conference on Green Computing and Internet of Things-2015.

3. Nitesh N Naik, Kartheek Kanagala, John P Veigas, “Achieving green computing by effective utilization of cloud resources using a cloud OS", International Conference ON Emerging Trends in Computing, Communication Nanotechnology-2013.

4. Fatima Shakeel, Seema Sharma-May, "A review on the efficiency of data centers and virtualization of servers”, International Conference on Computing, Communication, and Automation-2017.

5. Yashwant Singh, Neetesh Mehrotra, “A review on Green IT areas for cloud computing environment”, International Conference on Futuristic Trends on Computational Analysis and Knowledge Management-2015.

6. Saleh Atiewi, Salman Yussof. “Comparison between CloudSim and Green Cloud in Measuring Energy Consumption in a Cloud Environment”, 3rd International Conference on Advanced Computer Science Applications and Technologies-2014.

7. G. Rubyga, Ponzi R. K. Sathya Bhama, "A survey of computing strategies for the green cloud", Second International Conference on Science Technology Engineering and Management-2016.

8. Mridul Wadhwa, Approv Goel, “Green Cloud Computing- A Greener Approach to IT”, International Conference on Computational Intelligence and Knowledge Economy-2019.