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Energy Efficient Mechanism in Cloud Computing: A Review

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***Abstract*:** The Cloud services have provided scalable as well as flexible operations. However there remains challenges of energy efficiency. During the data transmission from server system that has been placed at central location to another cloud with a person at the client end; there is change in the energy flow ie. Large amount of energy is consumed as well as liberated during the execution of various ICT operations. Because of the priorities of both service providers and consumers, the areas like processing speed, bandwidth, transfer rate, storage and memory capacity just to mention a few, have caused a adverse effect on the environmental pollution which had not been realized earlier. This research has investigated in areas of a cloud setup that are held responsible for the loss of power dissipation. Research is undergoing to consolidate all possible approaches in order to sort out the challenges that are responsible for energy consumption. Here the discussion has been made related to cloud server along with existing researches in field energy consumption of cloud computing.

Keyword*:-*Cloud Computing, Cloud Model, Energy Efficiency

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I INTRODUCTION

The Cloud is known as internet or network of storage powerhouse that is available at distant location[1]. It provides the facilities on the network which may be public or private. Such network is seen in case of wide area network or local area network or in virtual private network. Lot of the applications such as ICT enabled operations, web based conferencing and email transfer are performed on the cloud.

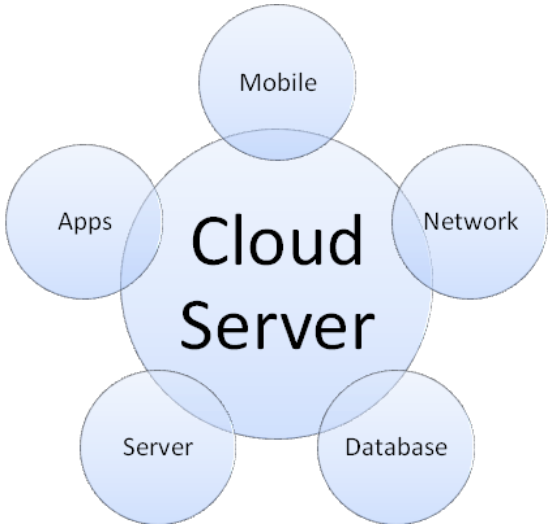

Fig. 1 Cloud sever[1]

The platform independency feature is offered by cloud computing as there is no requirement to set the software on computer[5].
Hence it can be assumed that business applications have been mobile & collaborative because of cloud computing.
There have been several services which are responsible for making cloud computing more feasible as well as accessible to the users.

II. CLOUD SERVER MODEL

Deployment model[6] defines the type of access to cloud. There have been four different types of accessibility in case of cloud. These are are private access, public access, Hybrid access and the community access.

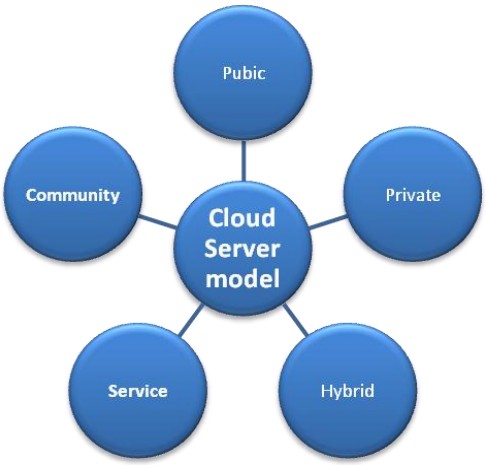

Fig. 2 Cloud Server model[6]

Public Cloud
Access to general public is allowed by public cloud. Due to open interface to all its users; public cloud is less secure as compared to other models.

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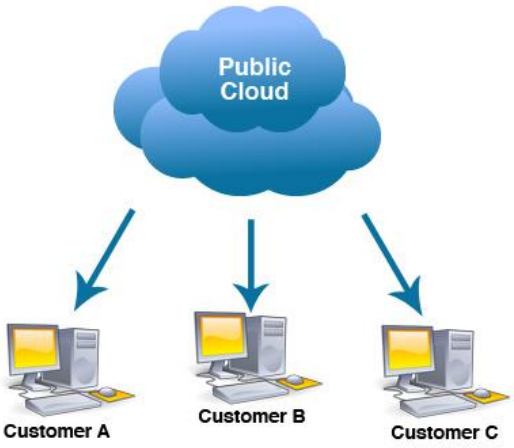

Fig. 3 Public Cloud[18]

Private Cloud

Private cloud is considered more secure and safe because of its private nature. Here, only the legal users are authorized to access its stored data.

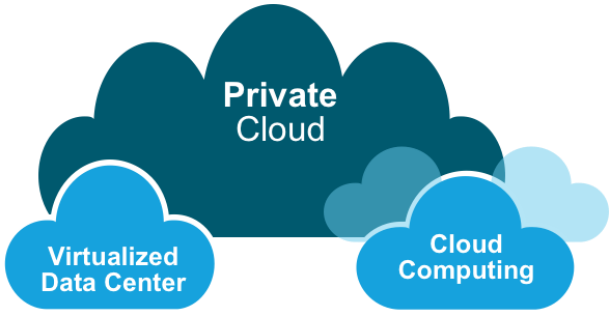

Fig. 4 Private Cloud[19]

Community Cloud

The Community cloud allows the accessibility to a specific group.

This type of computing is known as a collaborative effort where infrastructure has been shared among many organizations from particular community having common tastes such as security, jurisdiction, compliance etc.

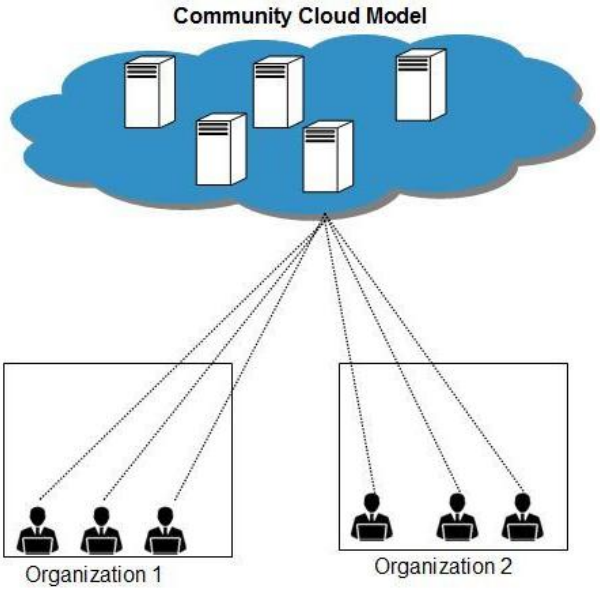

Fig. 5 Community Cloud Model[20]

These have been managed internally. Third-party may also manage it. These are hosted externally or internally. It has been controlled and utilized by a set of organizations having common taste. Expenses get divided in fewer users.

Hybrid Cloud

Hybrid Cloud is considered as union of public cloud as well as private cloud. Here the private cloud are performing critical tasks. The public cloud are performing non-critical tasks.[7]

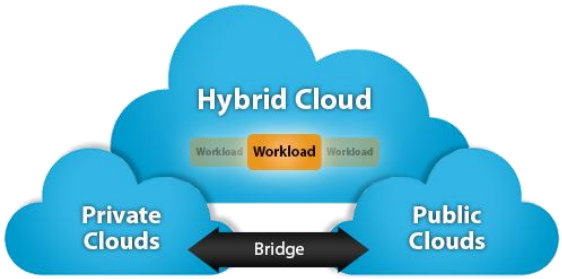

Fig. 5 Hybrid Cloud[21]

Service Models

There have been service models in case of cloud computing. First model is Infrastructure as a Service (IAAS). The Second model is Platform as a Service(PAAS). The third mode is Software as a Service(SAAS).

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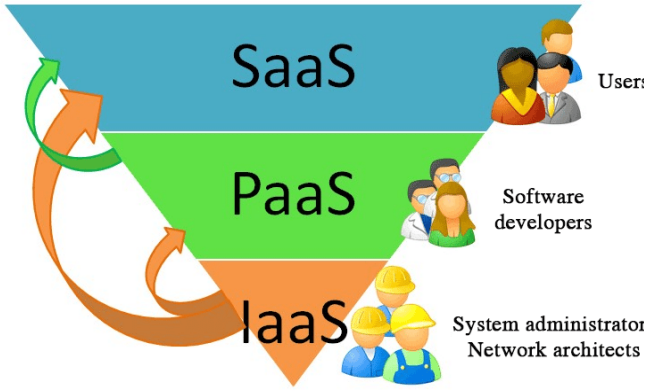

Fig. 6 Service Models[22]

III. LITERATURE REVIEW

Arindam B., Prateek A. & N. Ch. S. N. Iyengar (2013), "Energy Efficiency Model for Cloud Computing", [1]
Here, the need of power consumption and energy efficiency in cloud computing model has been investigated. It has been shown that there are few major components of cloud architecture which are responsible for high amount of power dissipation in cloud. The possible path to meet some sector for designing an energy efficiency technique has also been studied. Finally we have shown future research direction & continuity of this work for next level implementation.

Karim D., Django A., Richard K. (2013), "Energy Efficiency Embedded Service Lifecycle: Towards an Energy Efficient Cloud Computing Architecture"[2]
This paper has highlighted importance of providing novel methods & tools to support software developers aiming to optimize energy efficiency and minimize carbon footprint resulting from designing, developing, deploying and running software at different layers of cloud stack while maintaining other quality aspects of software to adequate & agreed levels.

Dejene B., Dzmitry K., Fabrizio G., (2015), "Energy-efficient data replication in cloud computing datacenters", [3]
The evaluation of proposed replication solution is based on the developed mathematical model and simulations using Green Cloud, simulator focusing on energy efficiency and communication processes in cloud computing data centers. The results confirm that replicating data closer to data consumers, cloud applications, could reduce energy consumption, bandwidth usage & communication delays substantially.

Pragya, Mrs Manjeet G. (2015), "Analysis of energy efficient scheduling algorithms in green cloud computing" [4]
Here the evaluated energy consumption have been studied using various scheduling algorithms. Consumption of energy varies a lot during the two abnormalities; one as task rejection by data center and other as the task failed on servers . In different scenarios tabularize above they have develop that round robin scheduling algorithm impart least task rejection & least failure of tasks.
Our future work may rectify these problems and we could formulate strategies to minimize power consumption, better task allocation policies in future for effective utilization of resources.

Banashankari, Chandan Raj.(2016), "A Survey on Power Efficiency in Cloud Computing to Optimize Cost", [5]
Cloud computing is having wide usage in world but it lacks with many issues that are addressed in research gap, mainly service reliability with energy efficiency. Many researchers are working on optimized energy efficiency technologies with better scalability & reliability of cloud computing. This paper concluded that more study is required over these issues. Here, green IT Technology framework specifications helps in reduction in greenhouse gas, energy efficiency improvement which also allows recycling and reuse. This framework also provides datacenter efficiency & CO2 emission measurement.

IV. ENERGY EFFICIENCY IN CLOUD INFRASTRUCTURES [8]

Energy efficient cloud is not about just targeting energy efficient host machines. Other existing element of cloud infrastructure needs to be considered in case of energy aware applications. Lots of the research has been made to develop individual energy efficient cloud components. Such researches investigated areas of a cloud setup which have been responsible in case of power dissipation. This research would consolidate all feasible approaches that have been used to tackle issues related to energy consumption [9].

Energy Efficient Hardware

One of the best technology to minimize power consumption in data centre & virtual machine level is the utilization of hardware that are energy efficient at host side. International standard bodies that are European TCO Certification [3], US Energy Star [4] are present to rate consumer products that are energy efficient. Rating of these product is important to measure environmental impact & peripherals & carbon footprint of computer products. Recent electronics materials such as solid-state drives are considered power efficient as compared to common hard disk drives but these devices are expensive.

Energy Efficient Clusters of Servers

Power dissipation have been minimized by optimal tasks scheduling[10] and CPU utilization. However cluster components like storage discs, memory, network peripherals etc. also consume power. The virtual machines having idle CPU could use considerable amount of energy.

V. FEATURE OF CLOUD COMPUTING

Cloud computing have offered lot of benefits & they are as follow

1. Operators in case of internet may access remote applications in utility form[11].
2. Customer could modify & configure application online at any time.
3. Cloud computing offeres online development tools.
4. cloud computing is providing online deployment

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tools.

5. Users have been provided platform for access of cloud resources which have been available over internet.
6. Cloud computing offers On-demand self services thus there remains no requirement of communication with cloud service provider.
7. It makes optimum utilization thus it is highly cost effective. Cloud computing operability renders high efficiency.
8. The Load Balancing feature of cloud computing makes it more reliable[14].

NEED OF CLOUD COMPUTING

1. Cloud computing provides 24x7 Support
2. Cloud computing pays as we use
3. Cloud computing has lower total cost of owner ship
4. The Cloud computing is providing reliability, sustainability scalability.
5. Cloud computing has provided Secure Storage Management [16].
6. Cloud computing has capability to free up internal resources.
7. This is allowing Easy & Agile Deployments.
8. These systems are Device & Location Independent[15].
9. These systems are automated at huge level.
10. Such systems are based on utility.

VI. FUTURE SCOPE

Thi research is beneficial for public & private cloud. Major requirement of day is to optimize energy flow of data transmission speed in a cloud computing over network. As load increases beyond some limit on clouds, causes collisions among packets sent by users. It is because of retransmissions occurs in cloud that could degrade performance. Such system is beneficial to carry heavy data over network. This system would also provide security to data as actual data is first encoded by replacing within key values.

Such system is also useful in educational & research sector as they provide bulk data transfer in secure way within reduced size.

The Cloud is providing flexible & scalable services. however there remains some challenges related to security because of data transfer from a cloud server storage to different cloud. Research is going to minimize the risk of energy loss.

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