REDUCTION OF TRAFFIC LOAD IN CLOUD COMPUTING USING ENERGY EFFICIENT CLUSTERING TECHNIQUE

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Abstract: Cloud computing data centres have grown in popularity recently for the supply of diverse computer resources. Reduced power usage is becoming a major concern for many data centres. Because of its ability to minimise the workload on data centres while also lowering overall energy consumption, the clustering approach in cloud computing is unsurpassed. In this paper, the focus is on energy efficiency and reducing load, and various energy efficiency and load balancing techniques are used to reduce the load at different data centres.

Keywords: Load Balancing, Clustering, Energy Consumption, Cloud Computing

Introduction: Networks of computers linked over the internet and sharing resources are what is meant by the term "cloud computing." There are a wide variety of resources that may be accessed, including hardware, software, services and more.

Using the internet and computer technology to complete our task is represented by the cloud word. The cloud's two most significant ideas are:

1. In cloud computing, the implementation specifics of the system are abstracted from both consumers and developers. All programmes operate on a physical system that is not described, and data is kept in unknown places. The management of the system is likewise outsourced. It's not clear what physical systems the applications are running on; data is kept in places that aren't stated; system management is outsourced; and access by users is universal.

2. By pooling and sharing resources, virtualization [10] is achieved. The virtualization of systems is one of the key benefits of cloud computing. Multi-tenancy is supported, and resources may be scaled with agility from a centralised infrastructure. Costs are evaluated on a metered basis. Virtualization may be performed by generating a virtual representation of any device or resource and splitting the framework into executable environments. Using a substation as an example of virtualization, electricity may be supplied to a variety of locations and at a variety of times. Amazon, Google, and Microsoft are some of the first companies to provide cloud computing services to the general public. Providing resources as services that can be accessed from anywhere and at any time is the goal of this concept. [12]

Explain Layer Architecture of cloud computing: -

Classifying cloud computing services based on the amount of abstraction of their capabilities and service models is done so as follows:

1. Infrastructure as a Service
2. Platform as a Service

3. Software as a Service

Higher-level services may be constructed from lower-level ones via the use of abstraction.

- **Infrastructure as a Service:**
  - On-demand virtual resources are offered as part of Infrastructure as a Service (IaaS) [1, 2, 4,12,13].
  - Various operating systems and bespoke software stacks are available for on-demand server deployment. Cloud computing systems' foundation is built on infrastructure services.
  - If you are referring to the EC2 service provided by Amazon Web Services (AWS), IaaS indicates that you may modify a software stack to provide virtual machines in the same way that physical servers can.
  - Users have access to a variety of rights, such as starting and stopping the server, adding software packages and configuring it, and creating virtual drives.

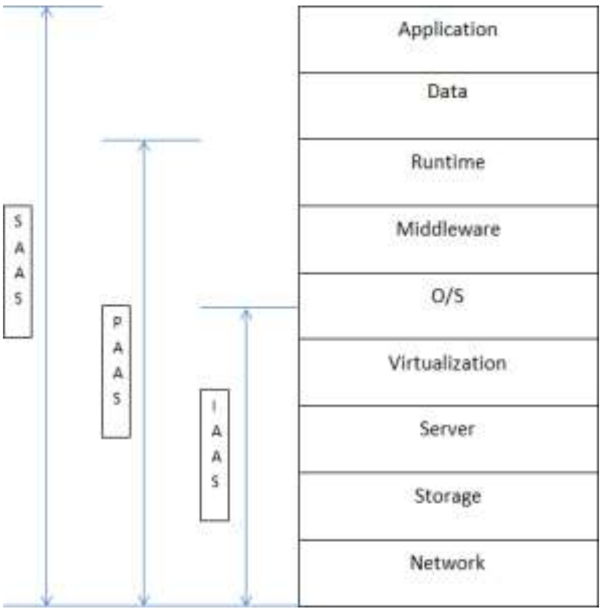

Figure 1: Layered Architecture of Cloud Service Model

- **Platform as aService:**
  - Higher levels of abstraction, such as those seen in PaaS [1,2,4,12,13], make cloud computing more readily programmable.
  - A cloud platform provides an environment where developers may construct and deploy programmes without having to worry about the processors and memory they'll be utilising.
  - It is possible to construct new apps using specialised services like data access, authentication, and payment.
  - Web applications that can be written in a particular language like python or Java may be developed and hosted in this environment. As an example of Platform as a Service, we may

point to Google App Engine.

- **Software as aservice:**
  - End users may access this layer's services through Web portals. Applications sit on the cloud's infrastructure. Consumers are moving away from locally installed software and toward internet services.
  - Traditional desktop apps like word processing and spreadsheets may be accessed over the web as a service. Software as a Service (SaaS) is a delivery paradigm for software applications [1,2,4,12,13].

Problem Statement: There is a lot of computing power in the cloud. The energy efficiency of cloud services at the IaaS, PaaS, and SaaS [1,2,4,12,13] tiers must be measured using methods and standards. New multi-objective optimization models are required to balance performance, energy efficiency [5,7,9], and cost in software-defined infrastructures and related protocols, tools, and models. Intelligent deployment and runtime optimization methodologies are required to assess the energy spent in light of the demand patterns of users. It is necessary to construct algorithms to forecast the behaviour of the various cloud-deployed apps since some are only utilised during the day and others only on the weekends. In cloud infrastructures, virtual infrastructure may be re-deployed at runtime to decrease the number of physical computers in use and to turn off underutilised machines in order to save costs and consumption.

Many studies have already been published on cloud computing's ability to conserve energy and reduce load [2,3,4,6]. We can conserve energy both while the system is in an optimal condition and when it is in a functioning state. When a large number of people are using the system at the same time, the load increases, causing the system to run more slowly. That's how cloud computing data centres can be made more efficient.

There are several ways to preserve energy and decrease load in the cloud [2,3,4,6]. Using merely algorithms, however, we may attempt to conserve more energy and lessen the burden on the cloud.

Existing and proposed work: Reduced energy efficiency is the subject of several studies [5,7,9]. It utilises a variety of methods and techniques to minimise network traffic and save energy, and it also employs a variety of different tools. However, they can only save 10% to 15% of the energy they use.

It is possible for me to save more energy and lower load [2,3,4,6] in my project by applying alternative algorithms and techniques.

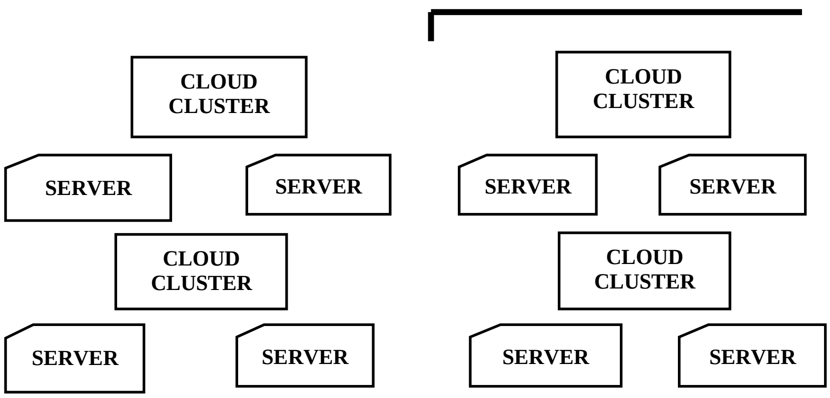

Figure 2: Flow of Control

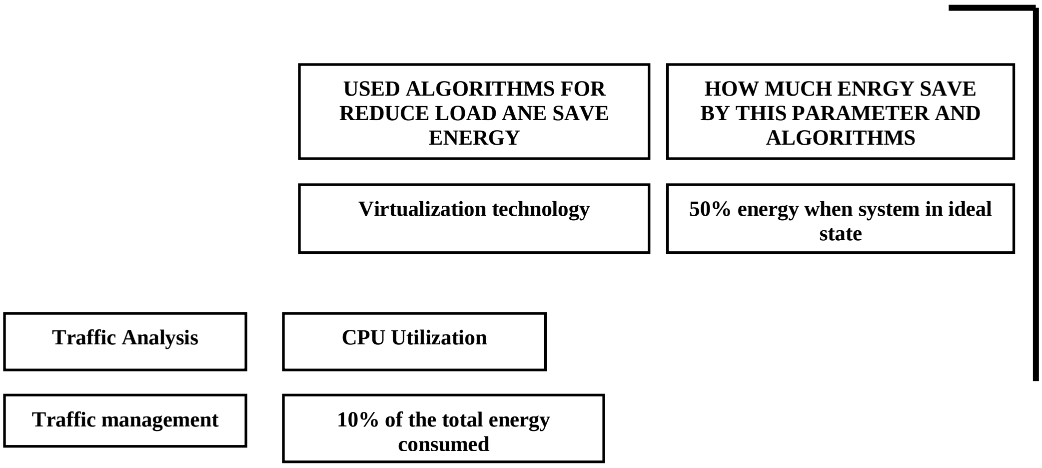

Figure 3: Proposed Architecture

Using the aforementioned parameter, we will apply our novel technique and improve cloud energy efficiency and minimise cloud computing load.

Proposed Algorithm:

Many studies have been done in the past to reduce load and improve energy efficiency. Most of the method decreases load and in terms of energy efficiency utilising various algorithms and different techniques using different tools. They may, however, save between 10% and 15% of their energy use by using purely renewable resources.

Different methods and techniques may be used to conserve more energy in a cloud data centre and minimise load.

Cloud computing's methodology for reducing load, cutting carbon footprint, and conserving energy has been applied in this case as well.

ALGORITHM:

Request=R

For (R=1; R<=n; R++) // R=Request

{

Collect all data center information from energy & carbon efficiency and cloud infrastructure. Make a record of data center collect from ECE & CIS

For (i=1; i<=n; i++)

{

DC[i] =CR;

}

For (i=1; i<=n; i++)

```
{
Make a table for CR (cluster record) from DC (data center)
}
Find the rank of data center on the basis of power usages effective and carbon footprint
RPUE&CF // Record of PUE&CF
{
For (CR=1; CR<=n; CR++)
{
Aggregate all CR on the basis of minimum energy consumption (MEC)
{
For (every host in host list do)
{
E1          energy consumption of presenthost;
E2          Compute energy consumption after initializing the VM E
E                                E2-E1;
}
Sort all host list on thebasisof     E
For (every host in host list do)
{
Checkupvalue of     E aftersometime;
{
Ifvalueof     E decrease
{
Find another host for VM;
}
For (every host in host list do)
{
E1          energy consumption of presenthost;
E2          Compute energy consumption after initializing the VM
E            E2-E1;
}
Aggregate all CR on the basis of MEC;
```

```
For (every host in host listdo)
{
If (host is suitable host list do)
{
        VM host
        Return VM;
    }
    Else
    {
Again,find    E
}
}
}
}
}
}
}
}
```

Conclusion: According to what I've learned about cloud computing's issues in terms of lowering load and conserving more energy, I've come across several criteria such as CPU usage, energy-aware, DVFC approaches, and so on. To conclusion, we can save more energy and lower the stress on cloud computing using the technique given in this work after doing the study.

Future Scope: The paper has a wide range of applications in the near future. Although energy can't be saved in an ideal condition in the suggested research, it is possible to do so by enhancing the algorithm, and the influence of various user applications may also be studied. It is also possible to examine the impact on carbon footprint of the distance between data centres' networks.

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