# Implementation of Energy Efficiency in Cloud Using Packet Size Reduction and KNNBased Virtual Machine Selection Mechanism

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***Abstract*--**The focus of the research is provide energy efficient model in case of cloud computing. Because the energy is distributed symmetric and the traffic load is disseminated over the network so we have to put minimum load on the network during packet transmission. Reduction of packet size using packet reduction logic leads to less space and time consumption. Such mechanism reduces the energy consumption too. More over The Integration of load balancing for energy efficiency consists of objectives to Manage cloudlet and virtual machine in such a way that there should be proper load balancing in virtual machines. This research would represent the influence of number of cloudlets and size on virtual machines.

**Keywords:** *Cloud, Packet, KNN, Energy Efficiency, Cloudlet, Virtual Machine*

## I. CLOUD COMPUTING

Resource sharing in a complete plug and play model which dramatically easier form of infrastructure planning is the satisfaction of cloud computing. The two key characteristics of that model are cost effectiveness and ease of use. Cloud computing is a computing model. It is a big pool of systems which is joined in private or public networks. it provide dynamically scalable infrastructure for application, file storage and data. With the advent of that method, application hosting, the cost of computation, content storage and delivery is decreased importantly.

## II. CLOUD COMPUTING MODELS

Cloud Providers provided services which could be grouped into three categories.

1. Software as a Service (SaaS):- In that model, a complete application is offered to the customer like a service on demand.

2. Platform as a Service (Paas): There, development area is encapsulated; a part of software and provided like a service, upon those other higher levels of service could be built.

3. Infrastructure as a Service: IaaS gives computing capabilities and basic storage such as standardized services upon the network.

## III. Proposed Protocol

In previous protocol enhancement the network lifetime and increasing the packet delivery ratio is strongly targeted. However proposed work focuses on the reduction of packet size in order to reduce the probability of congestion and to secure network from packet dropping attack.

Because the energy is distributed symmetric and the traffic load is disseminated over the network so we have to put minimum load on the network during packet transmission.

### *A. Packet Modification*

The data packet and control packet are the packets which are used in the existing protocol. The data packet transmits environmental data to destination, which consists of six elements. Buffer structure of the nodes also consists of the same elements as data packet to transmit the packets throughout network. In the data packet format, packet type is set by the T_DATA value to identify the packet format by neighbor nodes. In our proposed work T_Data value would be replaced by XT_Data using encoding scheme. Here we would check the frequency of repeated data in T_Data and then replace then with corresponding data having less length before packet transmission. The size of packet automatically gets reduced. Then packets would be grouped using clustering base in fuzzy system. The control packet is used to transmit RTS and CTS packets among nodes to report the neighborhood information. It is composed of seven elements. In this format, packet type is set by the T_RTS value to identify RTS packets and the T_CTS value to identify CTS packets received from the neighbors. After receiving xT_Data would be decoded to T_Data.

### *B. Proposed Algorithm*

1. At the beginning consider theDatapacket and control packet are the packets which are used.
2. Reduce Data Packet by replacing of T_Data with xT_data.

Packet Size Reduction Logic

3. Select CNs in case of neighbors along with (RE>REavg) & (ABS>ABSavg)
4. 4. set the NP based on sender node, SR and base station
5. 5. Determine distance between CN and np, Determine number of neighbors at CN

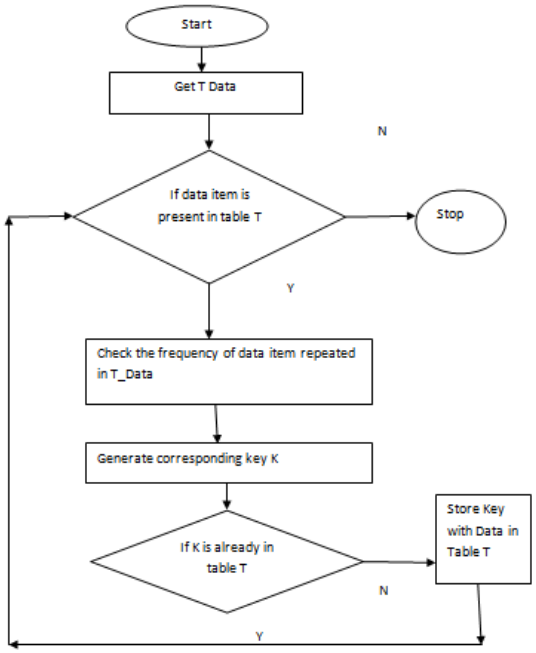


Fig. 1. Packet size reduction

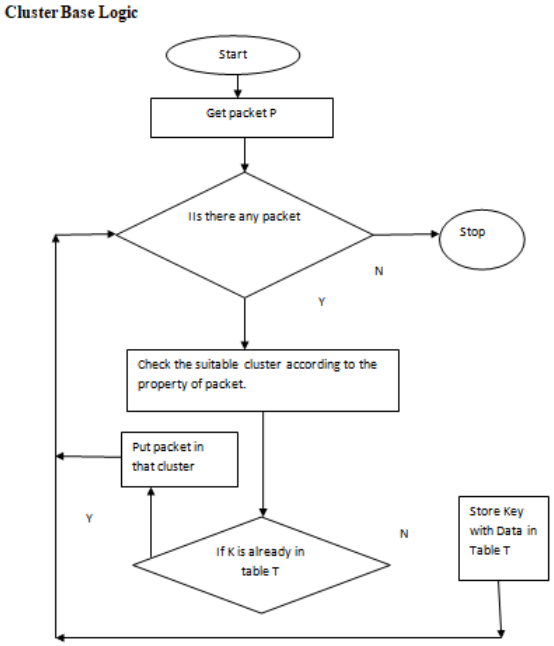


Fig. 2. Clustering mechanism

6 Perform Fuzzification using Fuzzy set , cluster Base , Rule base in inference Engine.

7. Perform defuzzification of data.

8. Get minimum T(n) and chose the node accordingly.

### *C. Benefits of Proposed Model*

Proposed work targets on reduction of packet size to minimize probability of congestion.

Proposed work does not focus only on boosting of network lifetime & growing packet delivery ratio. This one has also focuses on reduction of packet size. In Proposed work due to reduced sized packet there is less probability of congestion & it reduces transmission delay. other benefit is that packet is not transmitted as it is so there is more security too. As energy is disseminated symmetric & traffic load is distributed over network so these are need to put minimum load on network during packet transmission.

The benefits of proposed work are as follows:-

1. System is more secure as compared to traditional.
2. The probability of congestion is less as compared to traditional.
3. The life of packet is more as probability of packet loss decreases.
4. As packet loss decreases packet delivery ratio is far better than traditional work.
5. As size of Packet reduces load on network gets decreased.
6. Transmission of packet increases due to reduced size.
7. The overall performance gets boosted in case of proposed work at sender & receiver end.
8. The queuing delay gets reduced in case of proposed work.
9. Clustering allows grouping of packet so these are transmitted according to condition. Preprocessing time is considered before grouping information. If preprocessing time is more than there is no need to swap packet information.

### *D. KNN MODEL INTEGRATION IN PROPOSED MODEL*

Here we have n cloudlets for processing and there are two categories of virtual machine that could be randomly chosen in order balance the load. One is group regional virtual machines that are limited but could process cloudlet rapidly. Second group is of virtual machine that could be used for load balancing. These virtual machines could be selected on KNN based selection when all cloudlet would be allotted to regional virtual machine and there would be need to reduce the processing cycle and balance the load on regional machine then the selection of virtual machine available in KNN list would be made.

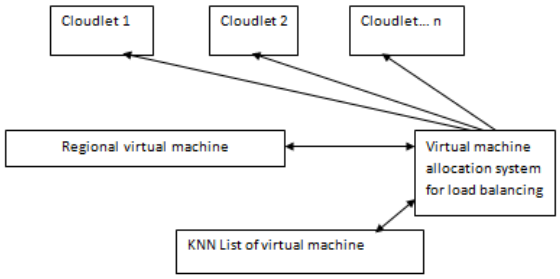


Fig. 3. KNN BASED VM SELECTION

**Algorithm for integration model**

1. Get VMindex of selected region, T,knn_list

2if(VMindex of selected region, T) is found in knn_cache_list then return VMName otherwise

3. Region list= regionVirtualmachineIndex,get(region)

4. k=knn_list.size();

5. if regionlist is not NULL then

6. listsize=size(regionlist)

7. if listsize=1 then

7. dcName=regionlist.get(0);

8. elseif listsize<=k then

9. Intrand=(int)(Math.random()*listsize);

10.VMName=regionallist(rand);

11.else

12.Intrand=(int)(Math.random()*knn_list.size());

13 VMName=knn_list(rand);

14.end if

15.end if

16. store VMName,VMindex of selected region, T to knn_cache_list.

17.return VMName

## IV. OBJECTIVE OF INTEGRATION

The Integration of load balancing for energy efficiency consists of following objectives

1. Manage cloudlet and virtual machine in such a way that there should be proper load balancing in virtual machines.
2. This research would represent the influence of number of cloudlets and size on virtual machines.
3. This research would consider the sharing of cloudlets in virtual machines in order to reduce time taken during processing.
4. Load balancing mechanism would also prevent unexpected crashing of servers hosted by virtual machine.
5. Load balancing would provide the benefit of zero downtime.
6. The objective of research is to provide high availability and provide energy efficiency.

## V. RESULT AND DISCUSSION

Here the discussion is made on Comparative analysis of traditional data transmission within proposed work

**Impact on Transmission Delay**

In our work we have reduced packet length that leads to fast data transmission.

Impact of our research on transmission delay

TABLE I. IMPACT ON TRANSMISSION DELAY)

| **Type of Deley** | **Effected/ No Effect** |
|---|---|
| Transmission Delay | Effected |
| Processing delay | Effected |
| Queuing Delay | Effected |
| Propagation Delay | Effected |

Here the discussion is made on Comparative analysis of overall Time consumption in tradition & proposed comparison system

TABLE II. TIME CONSUMPTION IN TRADITION & PROPOSED COMPARISON SYSTEM

| PACKETS | TRADITIONAL | PROPOSED |
|---|---|---|
| 10 | 5 | 2 |
| 20 | 5 | 2 |
| 30 | 8 | 3 |
| 40 | 8 | 3 |
| 50 | 10 | 4 |
| 60 | 10 | 4 |
| 70 | 11 | 5 |
| 80 | 11 | 5 |

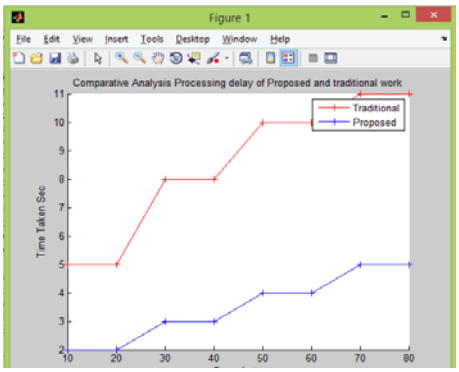

Fig. 4. Comparative analysis of overall Time consumption

TABLE III. QUEUING DELAY IN TRADITION & PROPOSED COMPARISON SYSTEM

| FILE SIZE | TRADITIONAL | PROPOSED |
|---|---|---|
| 10 | 6 | 3 |
| 20 | 6 | 3 |
| 30 | 9 | 4 |
| 40 | 9 | 4 |
| 50 | 11 | 4 |
| 60 | 11 | 4 |
| 70 | 13 | 5 |
| 80 | 13 | 5 |

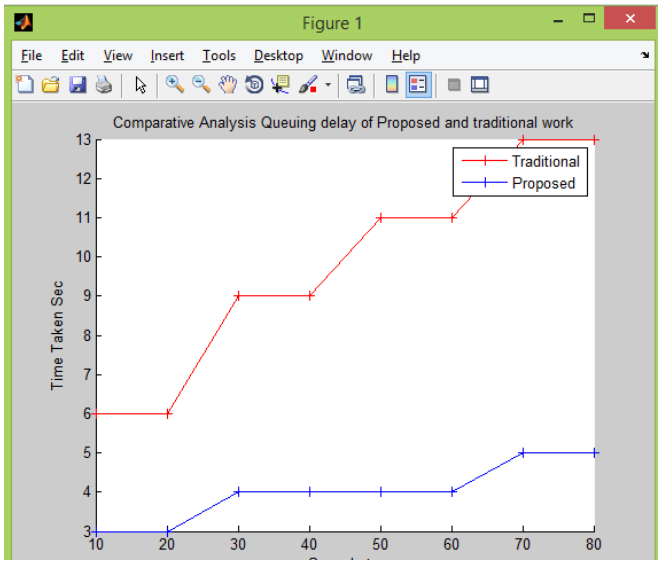


Fig. 5. Comparative analysis of Queuing delay in tradition & proposed comparison system

TABLE IV. COMPARATIVE ANALYSIS OF FILE SIZE IN TRADITION & PROPOSED COMPARISON SYSTEM

| PACKETS | TRADITIONAL | PROPOSED |
|---|---|---|
| 10 | 4020 | 1020 |
| 20 | 8090 | 2050 |
| 30 | 12100 | 3600 |
| 40 | 16201 | 4201 |
| 50 | 20300 | 5100 |

| | | |
|---|---|---|
| 60 | 24200 | 6300 |
| 70 | 29002 | 7210 |
| 80 | 33100 | 8543 |

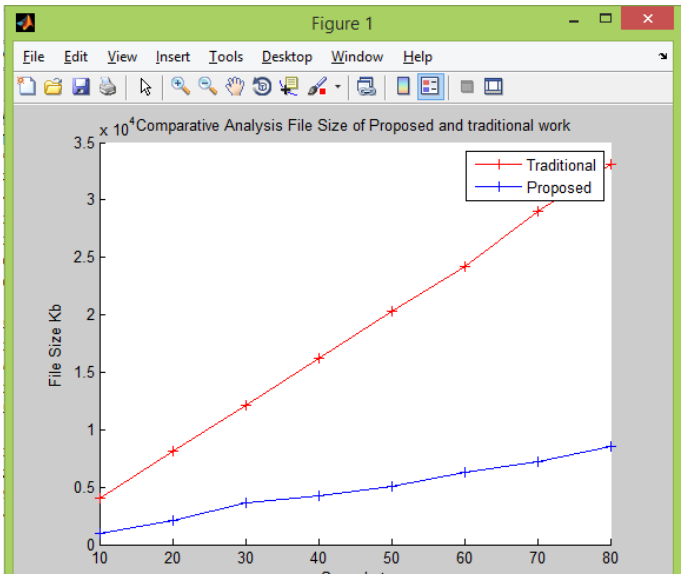


Fig. 6. Comparative analysis of File Size in tradition & proposed comparison system

The following interface would allow user to set regional virtual machine and virtual machine for knn list. Here the use would create also cloudlet.

Here we have three different cases

Case 1: Where the number of virtual machine are more than cloudlets. In this case the traditional and proposed work would perform in same way.

Case2: Where the number of virtual machine are equal than cloudlets. In this case the traditional and proposed work would perform in same way.

Case3: Where the number of virtual machine are less than cloudlets. In this case the proposed work would perform better than traditional work.

TABLE V.

| Number of cloudlet | Traditional | Proposed |
|---|---|---|
| 8 | 3 | 2 |
| 12 | 4 | 2 |
| 15 | 4 | 2 |

| | | |
|---|---|---|
| 20 | 6 | 3 |
| 25 | 7 | 4 |
| 30 | 8 | 4 |
| 35 | 9 | 5 |
| 40 | 11 | 6 |
| 45 | 12 | 6 |
| 50 | 13 | 7 |

Matlab based simulation of time taken between tradition and proposed work after load balancing

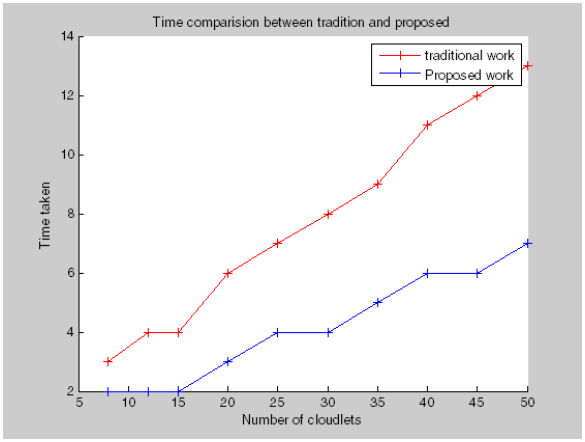


Fig. 7. Matlab based simulation representing the working comparative analysis of energy consumption between tradition and proposed work after load balancing.

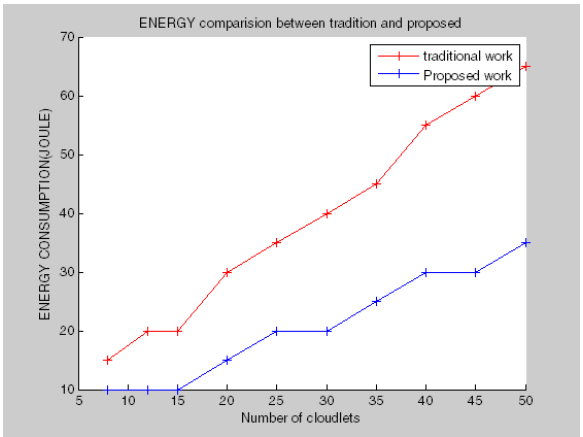


Fig. 8. Matlab based simulation of energy consumption between tradition and proposed work after load balancing

## VI. FUTURE SCOPE AND CONCLUSION

### FUTURE SCOPE

Objective of proposed work is on resource management strategies which are energy-efficient. It has been applicable on a virtualized data center by a Cloud provider. Required instrument that has been leveraged is live migration in case of Vitual Machines. Migration of Virtual Machinesamong physical hosts having low overhead has provided flexibility to a resource provider.

This is because virtual machines are dynamically reallocated according to current resource requirements. The Idle nodes are switched off to reduce the energy consumption.

This research is beneficial for public as well as private cloud. Main requirements to optimize energy flow of data transmission speed in case of a cloud computing over network. When load increases beyond some limit on clouds could cause collisions among packets sent by users. Such system is beneficial to carry heavy data over network. Such system are also useful in educational & research sector as they provide bulk data transfer in secure way within reduced size.

### CONCLUSION

Reduction of packet size using packet reduction logic leads to less space and time consumption. Such mechanism reduces the energy consumption too. Matlab based simulation representing the working comparative analysis of time taken between tradition and proposed work after load balancing concludes that proposed model takes less time. Matlab based simulation of energy consumption between tradition and proposed work after load balancing concludes that the proposed model consumes less energy.

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