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A Novel Dynamic and Effective Resource Allocation in Cloud for Energy Efficiency and Computing

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ABSTRACT-Cloud computing has become the defacto standard for communication for multiple applications in real world. This is becoming essential as mobile networks use clouds for application and data access but the problem remains for efficient resource utilization and energy use. The proposed model is JRP – Joint Resource Provisioning, which dynamically estimates jobs and switches on only the servers required and complete the jobs thereby saving the energy costs in a significant manner.

Keywords: Resource Provisioning, Energy Savings , Cloud Computing, Allocation, Resource Pooling

I. INTRODUCTION

The cloud computing being expanded to include mobile networks and the explosion of the internet has resulted in a very demand based cloud and always on model which consumes lots of resources like computing, storage and energy. Thus there is a need to curtail both capital and operational cost for the network operators. It incorporates cloud computing technologies where the cellular networks to meet the tremendous traffic demand in future mobile networks, a large number of networks and applications will be deployed and stretch the resources .

With the increasing number of application and networks connected, the energy consumption becomes a very challenging issue increasing on the fly. Therefore, it's important to manage resource provisioning and energy management of the cloud servers which is the focus here.

RELATED WORKS

D. Pompili, A. Hajisami, and T. X. Tran, "Elastic resource utilization framework for high capacity and energy efficiency in cloud "in 2016 clustered the neighbouring resources along with their corresponding VMs firstly here a coarse-grained approach was used to resize the Virtual Machines, based on the network traffic patterns at different time of a day. M. Qian, et al in their work "Baseband processing units virtualization for cloud radio access networks" formulated as a bin-packing problem, and a heuristic simulated annealing algorithm was provided to reduce power consumption of the CU pool. X. Wang et al in Energy-efficient virtual base station formation in optical-access-enabled Cloud-RAN in 2016 considered capacity constraints of front haul links and formulated the virtualized resource allocation problem as an integer linear programming problem, and presented a heuristic algorithm to minimize the energy consumption of Resource Control Units. The authors N. Yu Multi-resource allocation in cloud radio access networks aimed to minimize the number of CUs that are required to serve the UEs, with the consideration of multi-resource allocation in the CUs.

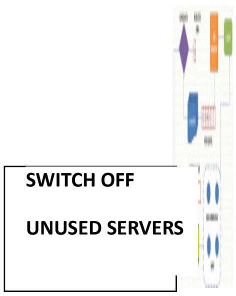
Y. Shi et al in their work " Group sparse beamforming for green Cloud-RAN" formulated a power minimization beamforming problem, and proposed a group sparse beamforming method to reduce the power consumption. N. Saxena et al in "Traffic-aware cloud RAN: A key for green 5G networks" in 2016 proposed an online stochastic game theoretic algorithm was adopted to learn the cellular traffic patterns which helps to reduce the network power consumption by switching on/off the server resources dynamically. M. Peng et al Energy efficient resource assignment and power allocation in heterogeneous cloud radio access networks proposed an energy-efficient optimization problem, which is about spectrum resource assignment and power allocation of RAUs, was solved to reduce the energy cost of the servers. A few recent works aimed to minimize the overall power.

J. Tang et al in their work "Cross-layer resource allocation with elastic service scaling in cloud radio access network" formulated a cross-layer resource allocation problem was, and solutions were proposed to optimize the VMs' capacities and the beamforming design of the active resources

K. Guo, et al in their work "Cooperative transmission meets computation provisioning in downlink" considered the transmit power allocation of RAU is optimized along with VM assignment

However, these works did not consider the energy saving in the cloud server and resulted in huge energy loss to the users. None of these above mentioned works has investigated the optimization of power consumption in the Computing Unit pool. Also most works did not consider the issues about VM consolidation in the Computing Unit pool.

PROPOSED ARCHITECTURE



The proposed architecture model first schedules the jobs in an intelligent manner so that jobs are not rejected and also at the same time estimates the amount of resources required to complete the job, only those computing servers required are switched on and the remaining resources are switched off. An intelligent resource engine JRP is switched on which overcomes the problem of dynamic resource provisioning, power consumption and virtual consolidation.

The jobs are dynamically sent to the VM Virtual Multiplexer in the cloud and then executed in totality. During the entire operations the computing pool is dedicated and hence the focus is on the result and no side allocations apart from the estimated values are allowed. This ensures the energy to be constant and hence ensures conservation.

The result is then sent back to the client while the engine computes the power and resources for the next scheduled jobs.

The model of the JRP algorithm is outline below.

JRP ALGORITHM

Input the Jobs Ji……n

Estimate the Load L for J i….n

Check the resources Available RAUi

for each i in J

    reduce the compute CU

    resource allotment

    switch on only nec rau…i

end for

Monitor the result R i….n

Output Op

Energy for switched Off S-> Si

Send Op To Client

RESULTS AND DISCUSSION

When split and the balance arrived the assignment is done heuristically as described above. Hence the messages i.e. communication messages are transmitted without any extra load and the job execution is perfect with no network degradation. Now the server is assigned to the client in the node junction.

PARAMETERS	EXISTING	JRP
RESOURCE ALLOCATION	85	98.5
ENERGY SAVED	40	75
COMPUTING	63	93

TABLE SHOWING EVALUATION PARAMETERS USING JRP

The outsourced data servers are switched on or off based on the need. This results in unwanted servers being switched off resulting in energy savings and lower computational overheads than the existing methods.

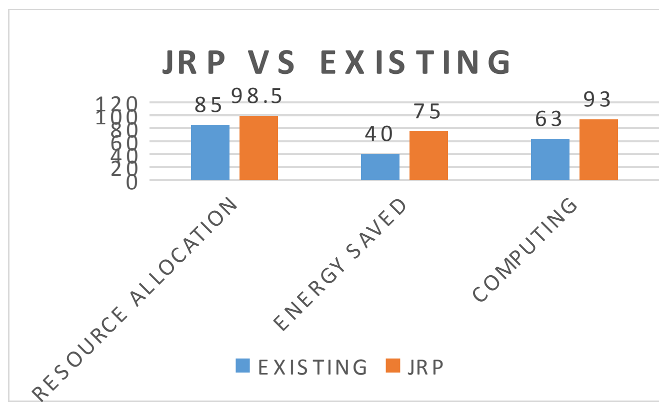


CHART SHOWING COMPUTED VALUES OF JRP MODEL

CONCLUSION

Thus the proposed model significantly reduces the energy consumption in clouds by dynamically switching the working states of resource severe and consolidating the Virtual Machines based on the jobs in the computing pool. Also switching off a part of under-utilized resource allocation units greatly saves energy which minimizes the number of active RAUs. Further to minimize the energy consumption of applications the proposed context-aware Virtual Machine consolidation strategy can make the trade-off between saving the energy and reducing the number of VM migrations

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