Result for Energy Efficient Scheduling in Green Cloud Computing

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Abstract: **The growth of Cloud at the time, when change in the climatic conditions and reductions in emissions for the energy use is a huge concern. As the demand of the cloud increases, energy requirements for the same have also been increasing. For all of the content like videos, pictures and other data to be delivered to us in real time must be stored somewhere so that it must be available at instantaneous access. Now, this huge data is stored at data center, which provides huge storage facilities consuming incredible amount of energy leading to increased operational cost, which not only declines the profit of Cloud providers, but also leads to high carbon emissions which is unfriendly to environment. So, solutions are required which are energy efficient to minimize the impact of Cloud computing on the environment. Green cloud computing is one of the solution to this problem which aims at increasing the energy efficiency during the products lifetime, promoting the recyclability of defunct products and reducing the use of hazardous products. So, aim of this research is to introduce a crossbreed scheduling algorithm which is energy efficient and to compare the results with the three scheduling algorithms which are (FCFS, Round Robin, and Priority). The simulation will take place in .Net environment which would be deployed over cloud network namely Window's Azure.**

Keywords: **Cloud computing, Green computing, Energy**

I. INTRODUCTION

Cloud computing refers to the delivery of computing services over the internet, using the services of internet to store data and use applications residing at some other place, webmail and social networking sites are best examples of cloud computing [1]. With the help of cloud computing, software and hardware services can be used which are located at some remote location and managed by the cloud vendors. The various services provided through cloud computing are data storage, user applications, processing power. The various characteristics of cloud computing are on demand service, resource pooling, broad network access, rapid elasticity, measured service. The services offered are Software as a service (SaaS), Platform as a Service (PaaS), Infrastructure as a service (IaaS), in Software as a service, application is hosted by the provider as a service to the user, in Platform as a service, the customer gets all the required resources for creating applications, the last service which is Infrastructure as a service, deals with the hardware services like providing storage space, CPU cycles [2].

There are four deployment models and these are private cloud, public cloud, community cloud and hybrid cloud. The public cloud is for general public, anyone can use the services of cloud. The private cloud is created and hosted for specific private customer that can also be a company. A community cloud is shared among set of customers having common goals and working requirements. Hybrid cloud is mixture of any two of the above described deployment models.

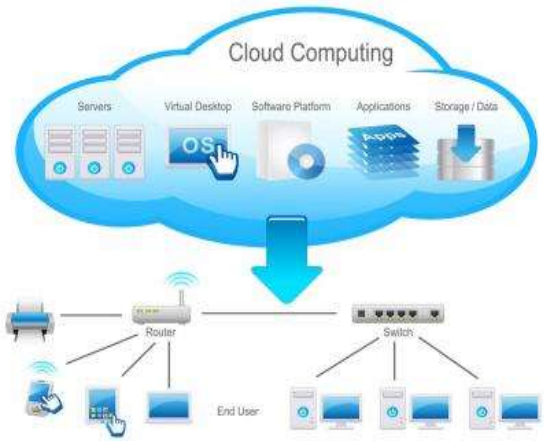


Figure 1: Overview of Cloud Computing

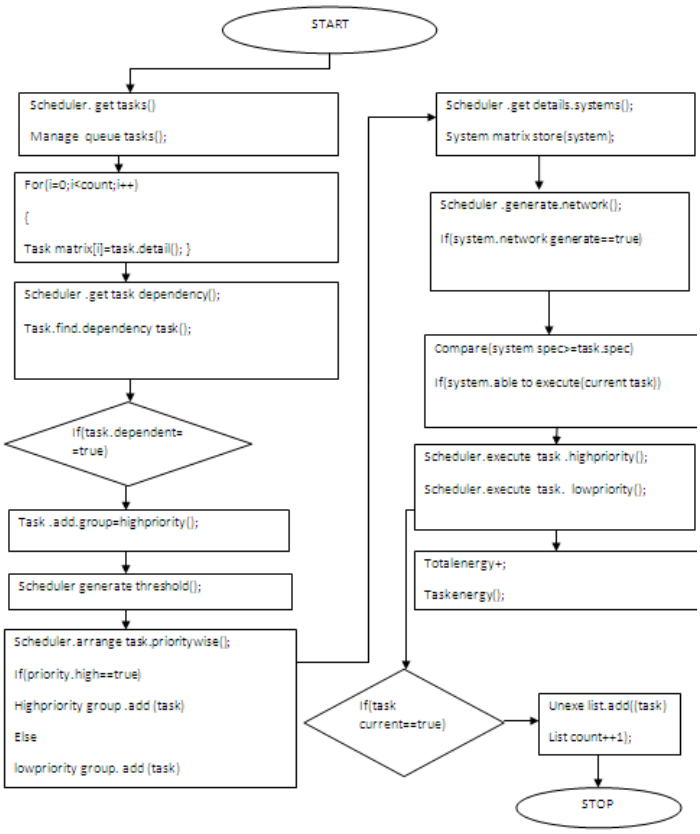
As the world is moving along with the development in the technology, trend of cloud services is also on hike. For example, Google is renowned for the successful usage of cloud platform services, most of its famous services like Gmail, Google Earth, and Google Documents are hosted from cloud. Facebook in January 2010, commissioned a new data centre in Oregon and for the power service they have tied up with PacificCorp, which generates most of its energy from coal fired power stations. [3]

There has been a great increase in the use of cloud services which has increased the demand for cloud infrastructure which in turn has expanded the need for energy consumption, this whole scenario has not only increased the operational costs but also lead to greater carbon emissions [4] .Increase in the content of carbon emissions lead to global warming which is a great problem for the world.

II. PROPOSED WORK

The goal of Cloud provider is to satisfy the user requirements and to increase its profit. In this research work, a task scheduling technique is proposed which is based on power consumption. The proposed crossbreed scheduling algorithm is compared with the FCFS, Round Robin and Priority scheduling algorithm. The simulation is done in a web application created in .Net framework which is used to create systems and tasks with different configurations and these tasks are scheduled by all the algorithms under simulation. The simulation is done taking different number of tasks each time and calculating energy for each algorithm.

III. MODEL STRUCTURE



IV. IMPLEMENTATOIN STEPS:

1. START
2. INPUT TASKS MANUAL/RANDOM SYSTEM GENERATED T_i where i =1:n
3. Initialize tasks_completed=0;
4. FOR I=1:N where n=number_of_tasks
5. Initialize task dependencies
6. If Ti==dependent
7. Ti.Priority=High(base)
8. Ti.priority=Low(Derived)
9. Scheduler.generateThreshold();
10. If Ti.belowThreshold==true
11. Ti.Priority=High(); else Ti.priority=low();
12. Initialize(System.Network)=true;
13. Start.execution=true;
14. If System.Specification.fulfills.Task.requirement
15. Execute.Task=true;
16. For all.tasks
17. Execute High Priority and Low Priority ;
18. Task_completed=task_completed+executed_task_count
19. Calculate.task.energy=true;
20. Energy[i]=energy.Ti;
21. End
22. Go to step 5 if task_completed<total_tasks(n);
23. Stop

V. RESULTS AND DISCUSSION

Below snapshots are the results by taking fixed number of systems which is 4 and taking different number of tasks each time i.e. 4,8,12,16 and calculating the energy consumption. The results of this research shows that the crossbreed scheduling algorithm is more energy efficient than (FCFS, Round Robin and Priority).The results of the simulations for different number of tasks are as follows:

Case-1: No. of systems - 4, No. of tasks - 4

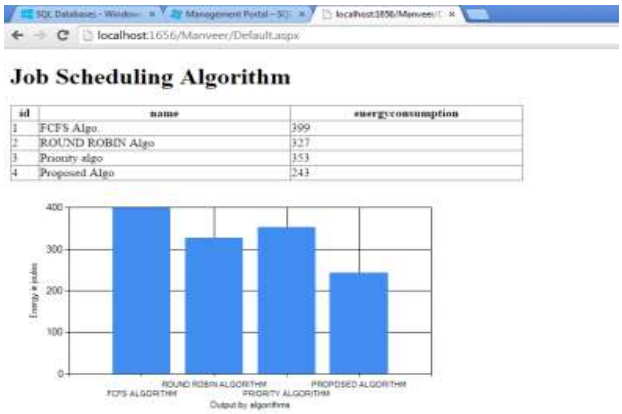


Figure 2: Case-1

Case-2: No. of systems - 4, No. of tasks – 8

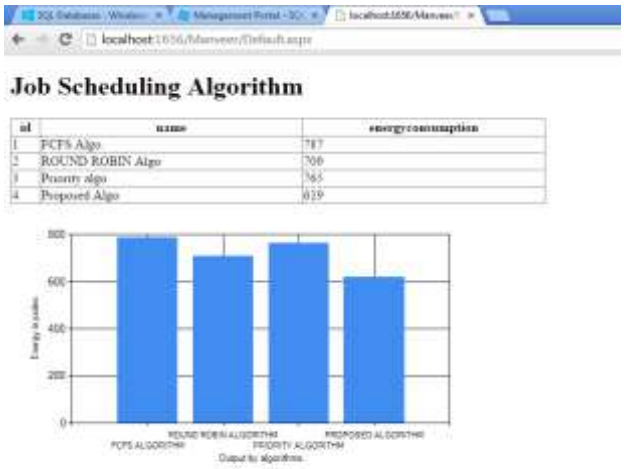


Figure 3: Case-2

Case-3: No. of systems - 4, No. of tasks – 12

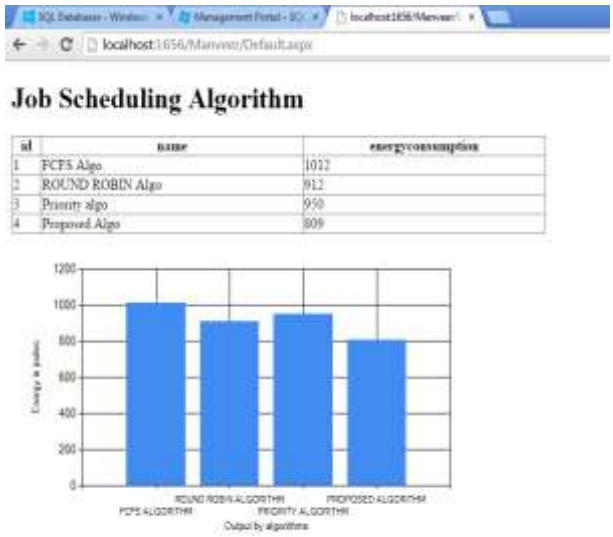


Figure 4: Case-3

Case-4: No. of systems - 4, No. of tasks – 16

Figure 5: Case-4

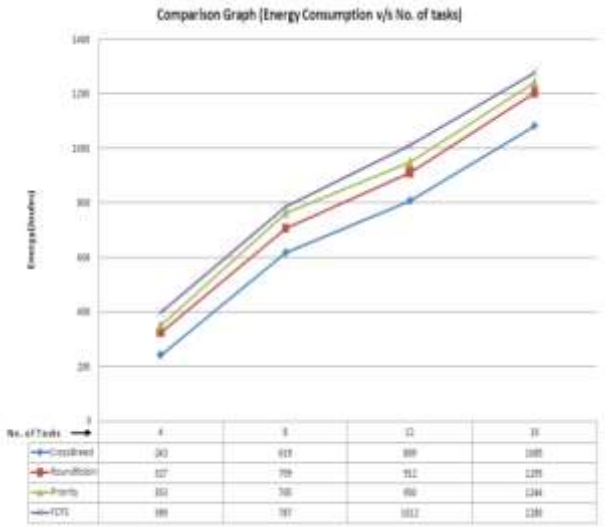


Figure 6: Performance Graph

VI. CONCLUSION

Above graph shows the performance evaluation using energy consumption versus no. of tasks executed by different algorithms. It is clear from the evaluation that the crossbreed algorithm is more energy efficient than the others and can contribute in cutting energy. But there remains scope for improvement every time when we develop a new solution. So, further research on this field is very important to cut the energy expenses and to save the environment.

REFERENCES

1) .https://www.priv.gc.ca/resource/fs-fi/02_05_d_51_cc_e.pdf
2) .http://www.south.cattelecom.com/Technologies/CloudComputing/0071626948_chap01.pdf
3) "Make IT Green: Cloud computing and its contribution to climate change" Greenpeace International, Published in March 2010.
4) Saurabh Kumar Garg and Rajkumar Buyya," Green Cloud computing and Environmental Sustainability"http://www.cloudbus.org/papers/Cloud-EnvSustainability2011.pdf
5) Maulik R. Kamdar " Literature Review: Green Computing – Implementation Procedures for Energy Efficiency" http://maulik-kamdar.com/2010/08/green-computing/

