International Journal of Innovative Research in Engineering Science and Technology
APRIL 2018 ISSN 2320 –981X

DYNAMIC VOLTAGE FREQUENCY ENERGY EFFICIENCY ALGORITHM FOR TASK SCHEDULING

SUGANTHI .S.K[1] **SUMITHA.M.D[2]** **SURUTHI.K[3]**

1
Department of Computer Science and Engineering
Vivekanandha College of Engineering for Women,
Tiruchengode – 637 205, India.
sugicse22697@gmail.com

2
Department of Computer Science and Engineering
Vivekanandha College of Engineering for Women,
Tiruchengode – 637 205, India.
sumisumitha04@gmail.com

3
Department of Computer Science and Engineering
Vivekanandha College of Engineering for Women,
Tiruchengode – 637 205, India.
suruthicse1211@gmail.com

Corresponding Author
e.mail :radhikadeva6@gmail.com
Contact : +91-7397569446

ABSTRACT

Cloud computing is a modern technology which contains a network of systems that form a cloud. Energy conservation is one of the major concern in cloud computing. Large amount of energy is wasted by the computers and other devices and the carbon dioxide gas is released into the atmosphere polluting the environment. Task scheduling is an emerging technology which focuses on preserving the environment by reducing various kinds of load. By doing this, utilization of resources should not be reduced. With less usage of energy, maximum resource utilization should be possible. For this purpose, many green task scheduling algorithms are used so that the energy consumption can be minimized in servers of cloud data centers. An emerging technology called Cloud computing can increase the utilization and efficiency of hardware equipment. The job scheduler is needed by a cloud datacenter to arrange resources for executing jobs. In this paper, we propose a scheduling algorithm for the cloud datacenter with a dynamic voltage frequency scaling technique. Our scheduling algorithm can efficiently increase resource utilization; hence, it can decrease the energy consumption for executing jobs. Experimental results show that our scheme can reduce more energy consumption than other schemes do. The performance of executing jobs is not sacrificed in our scheme.

KEYWORDS

- Cloud computing
- Energy consumption
- Resource utilization

1. INTRODUCTION

Cloud computing is emerging large scale computing which has moved computing and data away from desktop and portable PCs, into large data centers. It provides the scalable IT resources such as applications and services, as well as the infrastructure on which they operate, over the Internet, on pay-per-use basis to adjust the capacity quickly and easily. The National Institute of Standards and Technology (NIST) definition lists five essential characteristics of Cloud computing: on-demand self-service, broad network access, resource pooling rapid elasticity or expansion, and measured service. By increasing demand of cloud infrastructure has also increased the energy consumption of data centers, which has become a critical issue in cloud computing. In order to obtain more energy reduction as well as maintain the quality of service (QoS) dynamic voltage and frequency scaling (DVFS) is used.

DVFS is the adjustment of power and speed settings on a computing device's various processors, controller chips & peripheral devices to optimize resource allotment for tasks and minimize power saving when those resources are not needed. DVFS allows to dynamically adapting the machines performance to the changing condition of workload. Scheduling is performed on the basis of different parameters so that it increases the overall cloud performance. A task may include entering data, processing, accessing software, or storage functions. The data center classifies tasks according to the service-level agreement and requested services. Each task is then assigned to one of the available servers. In turn, the servers perform the requested task, and a response, or result, is transmitted back to the user. Cloud task scheduling is a NP complete problem.

In the process of task scheduling, the users submit their jobs to the cloud scheduler. The cloud scheduler inquires the cloud information service for getting the status of available resources and their properties and hence allocating the various tasks on different resources as per the task requirements. Cloud scheduler will assign multiple user tasks to multiple virtual machines. Good scheduling always assigns the virtual machines in an optimal way. A good scheduling algorithm always improves the CPU utilization, turnaround time and cumulative throughput. Task scheduling can be performed based on different parameters in different ways. They can be statically allocated to various resources at compile time or can be dynamically allocated at runtime.

1. This paper proposes an DVFS task scheduling algorithm. Within a given deadline, this algorithm can distribute the parallel applications in workflows to appropriate processors, and deals with them at the appropriate time slots to reduce energy consumption as well as meeting the required performance. An Energy-Efficient Task Scheduling Algorithm in DVFS-enabled Cloud.

2. Numerical experiments are given to verify that DEWTS can increase the CPU utilization of processors and reduce significant amount of energy consumption in a wide range of workflow structures compared with other researches.

3. We analyze the factors which are affecting the performance of our algorithm.

2. SYSTEM ARCHITECTURE

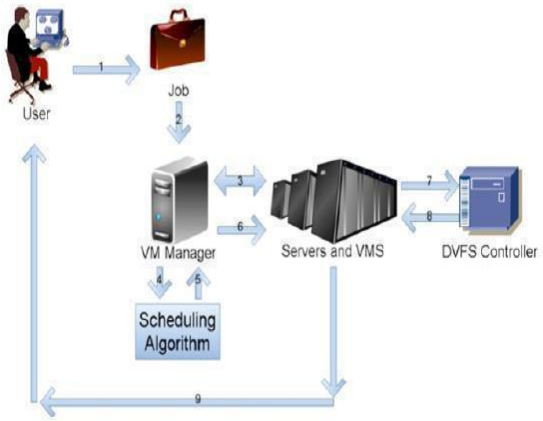

Fig. 2 Scheduling Process

3. EXISTING SYSTEM

Large-scale Internet services, unlike traditional computational tasks, whose request rates of clients vary along with time, which causes the provision of servers and devices more unpredictable. Many previous works show that, some servers in data centers usually keep a low average utilization, while others are utilized at a high level of frequency. The former servers are a waste of resources, while the latter servers are consuming a massive amount of energy. This phenomenon is caused by the lack of effective cooperative scheduling. As the number of users in cloud is increasing, the tasks to be scheduled also increases. The performance of the cloud is dependent on the task scheduling algorithms that is being used. Cloud servers are normally implemented in one or more data centers. The major component of a datacenter in energy consumption is the servers.

The usage of servers in an inefficient manner leads to more energy being consumed. In data centers, the reduction in energy consumption can be done by reducing the number of active servers. Initially more servers are provided to meet the increase in demand.

4. PROPOSED SYSTEM

DVFS technique to reduce the energy consumption of distributed systems. However, in these researches, the performance is sacrificed. In this paper, we provide a scheduling algorithm for allocating jobs in the cloud datacenter with DVFS techniques.

Our scheduling algorithm efficiently assigns proper resources to jobs according to requirements of jobs. Service Level Agreement (SLA) is also taken into account in our scheduling algorithm. Our scheme can reduce energy consumption, increase resource utilization, and meet SLA requirement. We provide an efficient solution for scheduling problems in Cloud computing. The tasks given to the servers should be scheduled within the particular processing time. The data center consists of many switches and routers which enables communication between the servers. In data centers, the task scheduling and allocation to servers is done with the help of a scheduling algorithm. Users send their request to the data center for computing whatever task they want to get executed. The task may be reading file contents, updating data, uploading files, downloading software, etc.

The data center will classify the tasks based on the scheduling algorithm that is used and then allocates the task to one of the available servers. The servers that are active can be reduced in order to conserve energy. Energy consumption can be maintained by making the active servers to continue their work.

4.1.ENERGY-SAVING OPTIMIZATION

In recent years, much attention has focused on energy aware scheduling for single processor, homogeneous system and heterogeneous resources. Many efficient techniques have been researched for reducing the energy consumption, such as DVFS mentioned in Section1, based on which, there have been a significant amount of task scheduling works. In DAG scheduling model, each task has an earliest start time (EST) and an earliest finish time (EFT) respectively. For specific tasks, the range between EST and EFT usually larger than the actual execution time, and we call the difference between them as slack time. For the running process of a system, amount of slack time are usually produced while waiting the output of predecessor tasks, or executing a task with earlier completion before its deadline.

Slack time reclamation technique is adopted in much of recent researches. The proposed a power aware scheduling algorithm of bag-of-tasks applications with deadline constraints on DVFS-enabled cluster systems. For reclaiming the slack time slots to save energy, Kimura et al. provided a slacking algorithm for adjusting the frequency of CPU dynamically to extended the task execution time. The two energy-conscious scheduling (ECS and ECS + idle) heuristics which took account into the balance between make span and energy consumption for parallel tasks in heterogeneous distributed computing systems. Designed a way to lower the frequency of noncritical tasks for parallel applications in heterogeneous distributed computing systems, and reassigned the tasks to appropriate time slots to low power consumption, named Enhanced Energy-efficient Scheduling (EES) algorithm.

The goals of these above works are to minimize the energy consumption of the tasks while still meeting the performance based on the determined service level agreement (SLA). To global optima with energy consumption and time cost. Except for the above works, most other researches only focus on either lessening the completion time or reducing the energy consumption. The objectives of most existing scheduling algorithms are to shorten the schedule length without caring about the energy consumption. Different from the researches aforementioned, our scheduling algorithm aims at reducing the energy consumption by decreasing the number of inefficiently processors. Meanwhile, through combining DVFS technique with list-based task scheduling polices, this algorithm can retain the quality of service by meeting the deadlines given by the providers.

5. SCHEDULING PROCESS

Task scheduling is the main problem in cloud computing which reduces the system performance. To improve system performance, there is need of an efficient task scheduling algorithm. Based on the allocation we design an algorithm for load scheduling by considering

the network bandwidth. A cloud is the collection of interconnected computer that are provided by one or more unified computing resources, a proper task scheduling is difficult to resource utilization and system performance. Many system parameters such as processor power, memory space ,and network bandwidth, affect the efficiency of task scheduling.

6. RELATED WORKS

In the previous works, the heuristic-based algorithms can be classified into a variety of categories, such as list scheduling algorithms, clustering heuristics, and duplication-based algorithms. The list scheduling algorithms are generally more practical, and their performances are better at a lower time complexity. A list scheduling algorithm maintains a list of all tasks of a given graph according to their priorities. It provides a DVFS scheduling algorithm for virtual machines in clusters. Therefore, related work in both frequency and voltage scaling, cluster computing, and virtual machine technologies need to be addressed and evaluated.

CONCLUSION

A Scheduling is one of the most important tasks in cloud computing environment. In this paper we have analyzed various scheduling algorithm which efficiently schedules the computational tasks in cloud environment. Efficient scheduling algorithms always play a significant role in the performance provided by a cloud computing system. A study of existing task scheduling algorithms is done in this paper. The analysis and measuring of virtual machine migration costs in a cluster, and the development of a DVFS energy efficiency algorithms for distributed systems. Large data centers using Cloud computing technologies, the need for efficient algorithms to minimize wasted server energy becomes increasingly important.

REFERENCES

1.Greenberg, A., Hamilton, J., Maltz, D.A., et al.: The cost of a cloud: Research problems in data center networks. ACM SIGCOMM Comput. Commun. Rev.39(1), 68–73 (2008)

2.Song, J.: Energy-efficiency model and measuring approach for cloud computing. J. Softw.23(2), 200–214 (2012)

3.Zhang, Y., Hu, X., Chen, D.: Task scheduling and voltage selection for energy minimization. In: Proceedings of 39th Design Automation Conference, pp. 183-188 (2002)

4.Rizvandi, N.B., Taheri, J., Zomaya, A.Y.: Some observations on optimal frequency selection in DVFS-based energy consumption minimization. J. Parallel Distrib. Comput. 71(8), 1154–1164 (2011) 5. Kimura, H., Sato, M., Hotta, Y., Boku, T., Takahashi, D.: Empirical study on reducing energy of parallel programs using slack reclamation by DVFS in

a power-scalable high performance cluster. In: IEEE International Conference on Cluster Computing, 2006, pp. 1–10. IEEE, NJ (2006)

6.G.Magklis, G. Semeraro, D. Albonesi, S. Dropsho, S. Dwarkadas, and M. Scott, “Dynamic frequency and voltage scaling multiple-clockdomain microprocessor,”

IEEE Micro, vol. 23, no. 6, pp. 62–68, 2003.G. Magklis, G. Semeraro, D. Albonesi, S. Dropsho, S. Dwarkadas.

7. M. Scott, “Dynamic frequency and voltage scaling multiple- clockdomain microprocessor,” IEEE Micro, vol. 23, no.
6, pp. 62–68, 2003.

8. F. Etro, "Introducing Cloud Computing," in London Conference on Cloud Computing For the Public Sector, 2010, pp. 01-20.

8. K. Thyagarajan, S. Vasu, and S. Harsha, "A Model for an Optimal Approach for Job Scheduling in Cloud Computing,"in International Journal of Engineering Research and Technology, 2013.

9. Ning Liu, Ziqian Dong, Roberto Rojas-Cessa,“Task Scheduling and Server Provisioning for Energy Efficient Cloud-Computing Data Centers”, IEEE 33rd

International Conference on Distributed Computing Systems Workshops Task, 2013.

10. Shenai Sudhir, Survey on Scheduling Issues in Cloud Computing, Procedia Engineering, Elsevier, 2012.

11. N.Nasurudeen Ahamed , “An

Intergrated Protection Scheme For Big Data And Cloud Services”, International Journal of Engineering and Computer Sciences(IJECS),Vol.2,Issue 10,March 2016