International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 05 Issue: 08 | Aug - 2021 ISSN: 2582-3930

REVIEW WORK ON MAPREDUCE SCHEDULING FOR DEADLINE-CONSTRAINED JOBS IN HETEROGENEOUS CLOUD COMPUTING SYSTEMS

Miss. Shivani Mirase
Dept.of electrical engineering
Vidarbha Institute of Technology, Nagpur

Prof Pravin Kulurkar.
Dept.of electrical engineering
Vidarbha Institute of Technology, Nagpur

Dr. Sanjay S.Uttarwar
Dept.of electrical engineering
Vidarbha Institute of Technology, Nagpur

Abstract

MapReduce is a software framework for processing data-intensive applications with a parallel manner in cloud computing systems. Some MapReduce jobs have the deadline requirements for their job execution. The existing deadline-constrained MapReduce scheduling schemes do not consider the following two problems: various node performance and dynamical task execution time. In this paper, we utilize the Bipartite Graph modelling to propose a new MapReduce Scheduler called the BGMRS. The BGMRS can obtain the optimal solution of the deadline-constrained scheduling problem by transforming the problem into a well-known graph problem: minimum weighted bipartite matching. The BGMRS has the following features. It considers the heterogeneous cloud computing environment, such that the computing resources of some nodes cannot meet the deadlines of some jobs. In addition to meeting the deadline requirement, the BGMRS also takes the data locality into the computing resource allocation for shortening the data access time of a job. However, if the total available computing resources of the system cannot satisfy the deadline requirements of all jobs, the BGMRS can minimize the number of jobs with the deadline violation. Finally, both simulation and testbed experiments are performed to demonstrate the effectiveness of the BGMRS in the deadline-constrained scheduling.

1. INTRODUCTION

The CLOUD computing can provide scalable computing and storage resources by connecting tens of thousands of commodity servers over a network. Due to owning the scalable resource feature, data-intensive applications are suitably developed in the cloud computing environment. The data-intensive applications usually need to handle a huge amount of data sets, such as business intelligence, financial analysis, click-log mining, etc. To efficiently run data-intensive applications in the cloud computing environment, Google has developed a parallel programming model called the MapReduce framework [1]. In the MapReduce, the execution of a job (an application) is divided into two main phases: map and reduce. A number of map (reduce) takes are issued to concurrently run in multiple nodes for collaborating on the data processing of a job. Many data-intensive jobs may be run simultaneously in a cloud computing system. In the MapReduce framework, it has designed several schedulers (e.g., FIFO, Fair, and Capacity schedulers [2]) to consider the cloud resource sharing among multiple jobs. However, these schedulers do not take the job deadline into account. When users run important data-intensive jobs, they usually specify the expected job in the Service Level Agreements (SLAs) with the cloud provider. In such a case, if a job i has a shorter deadline than a job j, the MapReduce scheduler should consider to allocate different resources for jobs i and j to meet their deadline requirements. The issue of the Deadline-Constrained MapReduce Scheduling (DCMRS) has been investigated by some prominent researchers [3]–[7]. However, the following points are not concerned in the existing schemes.

1. Slot performance heterogeneity: Originally, the slots of a MapReduce framework system are not distinguished with each other, which are assumed with the homogeneous performance. In practice, a slot represent a portion resource of a node, which can be also regarded as a virtual machine (VM). In [8], the slot is instead of the VM. In a cloud computing system, the node heterogeneity is inevitable since there are a large number of nodes in the system [9]. It is difficult to ask all nodes with the same performance and capacity in their CPUs, memory, and disks. Due to the sake of node heterogeneity, the slots in different nodes have different amount

of computing resources. From the viewpoint of a short-deadline job, if its map (reduce) tasks are allocated in the fewer-resource slots, the job may not be completed within its specified deadline. Note that, the fewer resource indicates the slot with low CPU performance (in terms of MIPS) and memory size. The more-resource slot represents the slot with more resources in CPU performance and memory size than the fewer-resource slot.

2. LITERATURE SURVEY

There are many parameters based on which algorithms have been proposed. These parameters ifconsidered improve the utilization of cloud resources.Scheduling in case of mobile cloud computing is well researched. Task scheduler model [1] for mobile cloud computing is one of the algorithm that focused on reducing energy consumption and monetary cost in case of deployment in public cloud and energy consumption parameter in case of deploying in private cloud.Most algorithms consider CPU and memory as important resource; the proposed heuristic approach [2] takes bandwidth to load tasks to resources as constraint. Here each task is processed before actual allocation. The algorithm effectively utilizes memory, bandwidth and CPU when compared with the existing algorithms and gives 50% less response time. .For scheduling in heterogeneous cloud environment, a map reduce scheduling algorithm [3] was proposed that considered job deadline unlike other map reduce algorithms like FIFO, Fair and capacity schedulers for data-intensive applications. For allocation among slots having different computing power, the job deadline was divided into map and reducessub deadlines and minimum weighted bipartite graph was modeledfor finding appropriate slots. Both test bed and simulations results said that there was reduction in job elapsed time9by 79%), deadline over job ratio(by 56%) and computational time was just 0.0243 seconds.For a known minimum cost that a user can pay for a particular application on cloud, a cost budgeted algorithm [4] was proposed that obtained minimum energy when experimented on three different applications.In order to optimize the scheduling decision while satisfying discrete user demands, HEFT-T (heterogeneous earliest finish time and topsis) algorithm [5] considered task priority and processor selection with time deadlines. It proved to be better in deadline achieving and task scalability, but HEFT gave lower total execution time.Numerous workflow based applications are stored in cloud. The proposed algorithm [6], Extended dynamic constraint algorithm(add-on of multiple choice knapsack problem-MCKP) was compared with two prevailing scheduling algorithms -Extended Dynamic Constraint Algorithm (EDCA) and Extended Biobjective dynamic level scheduling (EBDLS). It guaranteed that monetary cost is optimized along with secure and reliable operation.It reduced 25% failures while generating the cheapest solutions among three algorithms.Resource allocation for workflow scheduling always persists as a problem. Next is the study of a novel hybrid algorithm CR-AC; which is the combination of chemical reaction optimization and ant colony optimization algorithms proposed[7] to optimize the workflow scheduling algorithm. When compared with traditional CRO, ACO and recent PSO and CEGA; it is observed that the new algorithm gives better results in terms of makespan and cost of scheduling the three workflows, on a number of machines. It achieves a high-standard optimal solution with low cost under the deadline constraint. Outperforms given algorithms in all cases(different tasks on different no of VMs).An optimization algorithm 'Slave ants based ant colony optimization algorithm', based on the population of ant movement wa s proposed [8]. Results show that SCAO does not exceed ACO when no of tasks is 100, because it involves pre-processing time. With the increase in number of tasks the make span of ACO is always more than SACO. Hence, optimal solution is guaranteed with least processing overheads, while maximizing utilization of cloud servers, as observed in results. In this era of big data, a lot of computing resources are required to process huge data. So for flexibility, when a company owns a private cloud cluster which is limited, a proper public cloud resources selection and cost-productive hybrid cloud infrastructure is required for processing big data. The scheduling in hybrid cloud for heterogeneous workloads [9] followed genetic algorithm to obtain optimal choices of job queues by dividing jobs into I/O intensive and CPU intensive jobs. The algorithm resulted in better job response time and gave higher throughput than privatecloud cluster operations. There are many workflow scheduling algorithms designed, neither of which considered uncertainties associated with workflows. The uncertain execution time of a task on amachine, and the random uncertain arrival of workflows resulted in the coming of unceRtainty aware Online Scheduling Algorithm[17] abbreviated as ROSA. Being aware of uncertainties, this algorithm optimizes service.

1. Conclusion

In this project, improving the power supply for solar energy in CMLI and reducing the number of semiconductor keys are investigated. The 15-level output must be achieved with only 12 keys in binary mode and 7 keys in MMC mode. In addition, the 27-level output is available in 12 keys via trinary mode. The mathematics of the model for the implemented solar PV is directly related to the phase inverter. Analytical analysis of the study was carried out for the different categories and comparisons were made. A photovoltaic powered 3 kWp CMLI is implemented for all three details of the topology and generated harmonics. Based on the observations, the design method offers many advantages including reduced THD, low cost, simple design, small computational size and lack of transformers, dynamic converters, detailed tables and cleaning departments. Furthermore, these methods are more suitable for standalone / networked PV systems to improve energy efficiency.

2. Reference

[1] Albert Alexander and Manigandan Thathan, 2015: "Modelling and analysis of modular multilevel converter for solar photovoltaic applications to improve power quality", The institution of Engineering and Technology 2015, IET Renew. Power Gener., 2015, Vol. 9, Iss. 1, pp. 78–88.

[2] Jih-Sheng Lai and Fang Zheng Peng , MAY-JUNE 1996 ,"Multilevel Converters-A New Breed of Power Converters", IEEE TRANSACTIONS ON INDUSTRY APPLICATIONS, VOL. 32, NO. 3.

[3] Rahim, N.A., Selvaraj, J.,2010 „Multistring five-level inverter with novel PWM control scheme for PV application", IEEE Trans. Ind. Electron., , 57, (6), pp. 2111–2123.

[4] Selvaraj, J., Rahim, N.A. 2009„Multilevel inverter for grid-connected PV system employing digital PI controller", IEEE Trans. Ind. Electron., 56, (1), pp. 149–158.

[5] Rahim, N.A., Chaniago, K., Selvaraj, J,2011 „Single-phase seven-level grid-connected inverter for photovoltaic system", IEEE Trans. Ind. Electron., 58, (6), pp. 2435–2443.

[6] Barbosa, P.G., Braga, H.A.C., 2006 do Carmo Barbosa Rodrigues, M., Teixeira, E.C.: „Boost current multilevel inverter and its application on single-phase grid-connected photovoltaic systems", IEEE Trans. Power Electron. 21, (4), pp. 1116–1124.

[7] Villanueva, E., Correa, P., Rodríguez, J., Pacas, M. 2009„Control of a single-phase cascaded H-bridge multilevel inverter for grid-connected photovoltaic systems", IEEE Trans. Ind. Electron., 56, (11), pp. 4399–4406.