Implementation of Job Scheduling in Cloud Computing using various Scheduling Algorithms: A Review

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Abstract: *Cloud computing has come out to be an interesting and beneficial way of changing the whole computing Schedulers for cloud computing determine on which processing resource jobs of a workflow should be allocated. Scheduling theory for cloud computing is in advance a lot of awareness with increasing popularity in this cloud era. So, this paper reviews the optimization of scheduling problem in cloud computing along with various previously used algorithms in the field of scheduling in cloud computing.*

Keywords: *Cloud Computing, Scheduling, Energy conservation, management.*

I.   Introduction

Not surprisingly, the potential for cost savings is a huge factor in the equation. In the 2010 Global Information Security Survey, Ernst and Young (2010) found organizations searching for ways to reduce IT expenditures without sacrificing technological advantages, stating: "Their interest lies in computing services that require significantly less initial investment, fewer skilled internal IT resources and lower operating costs. As a result, cloud computing services are gaining greater adoption .Two cloud user surveys from IDC (2008, 2009) show that the potential for cost savings is the major driver of cloud services adoption by organizations. The most recent IDC (2009) survey found that of the top five ranked cloud service benefits selected by participants, three were economical in nature: "pay for use (#1), payments streamed with use (#3) and shift of IT headcount and costs to the service provider (#5)" .
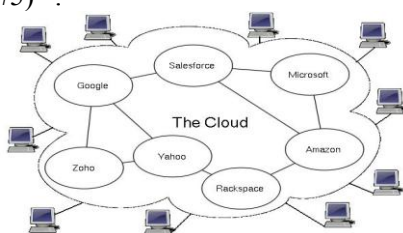

Figure. 1 Cloud Computing Environment
The cloud does seem solve some long-standing issues with the ever increasing costs of implementing, maintaining, and supporting an IT infrastructure that is seldom utilized anywhere near its capacity in the single-owner environment. There is an opportunity to increase efficiency and reduce costs in the IT portion of the business and decision-makers are beginning to pay attention. Vendors who can provide a secure, high-availability, scalable infrastructure to the masses may be poised to succeed in getting organizations to adopt their cloud services [2].

II. MOTIVATION TO JOB SCHEDULING

Now a day's cloud computing is a promising computing paradigm which is to support services such as Infrastructure as a Service, Software as a Service, Platform as a Service. Computer scientist predicting that cloud system is next generation operating system. Google engineers say a magnificent sentence maintains thousands of servers, warned that if power consumption continues to increase, power cost can easily overtake hardware cost by a large margin [2]. Consumer of cloud only needs internet connection. The burden of purchasing a new license copy, installing an application, update that copy monthly all burden can be removed, if users are cloud utilize [1],[5]. Cloud can easily provide all these facilities. Cloud computing is open source for cloud developers [1]. The development of hypervisors Xen, KVM, VMware, Virtual box,

Eucalyptus [3] etc. triggering development of commercial and Open source Cloud environment. It can offer services on base of energy, power Pay-per use model. In office environments, computers, Monitors account for highest energy consumption after lighting. Power dissipation is also a major concern in portable battery operated devices that have rapidly increased [2]. A variety of scheduling techniques have been developed in previous years. FCFS, Greedy [4], round robin [5], Priority Scheduling, Shortest Job First, Back Filling in operating system for scheduling number of processes coming from users. All this algorithms are to save amount of energy, time as well as power.
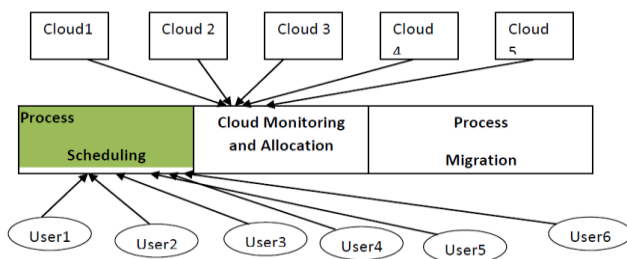

Figure.2 Job Scheduling System

III. RELATED WORK

In this decade we refer many approaches viz. algorithm, methods, paradigms, techniques how to schedule virtual machines running on physical machines and also concentrate on energy consumption less, power and time optimization , fully workload distribution , exploitation with physical machine ratability.

1. M. Devare et al. [6] proposed a scheduling policy to implement Scheduler which assign number of virtual machine requests coming from consumer to virtual machines on the base of 'bully' and "non-bully" approach.

2. M. Devare et al [7] discusses various hypervisors their development strategies and facilities for the Cloud systems. The Xen, VirtualBox, KVM and VMWare are being discussed. Moreover, it illustrates the comparison of cost reduction in electricity utilization due to virtualization and cloud systems.

3. Jiandun Li et al [10] introduce a hybrid energy-efficient scheduling algorithm for private clouds to reduce coming request response time, balance workload when data centre is running in low power mode and design algorithm on the base of pre power techniques and Least-load first algorithm.

4. Jiandun Li et al [11] introduce a hybrid energy-efficient scheduling algorithm for private clouds, concentrated on load balancing, Load migration on the base of state of virtual machines, count response time. If response time increases then energy also increases. So they minimised response time in their algorithm.

5. Saurabh Kumar Garg et al [12] presented a few scheduling approaches that could utilize heterogeneity across various data centres.

6. Akshat Verma et al. [13] also presents a dynamic power aware strategy.

7. Chuliang Weng, Zhigang Wang et al [14] present hybrid scheduling framework for the CPU scheduling in the virtual machine monitor. Two types of applications are high-throughput type and concurrent type. Virtual machine sets concurrent type when majority of workload is concurrent applications in order to reduce cost of synchronization. Otherwise it is set to high-throughput type by default. Experiments and results show that framework and scheduling strategy is flexible to improve performance of virtual machine.

8. Gaurav Dhiman, Giacomo Marchetti et al [15] focus on vGreen developed MPC balance algorithm that concentrates on CPU and memory utilization decrease, amount of power save up to 15% to 20% of total power required. Power is directly propositional to energy so amount of energy also save.

9. Gregor Von Laszewski et al [16] proposed scheduling virtual machine in a compute cluster to reduce power consumption through Dynamic Voltage Frequency Scaling (DVFS), implementation of energy efficient algorithm to allocate virtual machine.

IV. MATERIALS AND METHODS

In this study, various job scheduling algorithms of Cloud computing were carefully selected for study and evaluation, namely,
• First Job Scheduling
• Priority based Job Scheduling Algorithm
• Task based Job Scheduling Algorithm

A. FCFS
• First-come, first-served (FCFS) – sometimes first-in, first-served and first-come, first choice – is a service policy whereby the requests of customers or clients are attended to in the order that they arrived, without other biases or preferences. The policy can be employed when processing sales orders, in determining restaurant seating, on a taxi stand, etc. In Western society, it is the standard policy for the

processing of most queues in which people wait for a service that was not prearranged or pre-planned.

B. Priority based Job Scheduling Algorithm

In Priority Scheduling, each process is given a priority, and higher priority methods are executed first, while equal priorities are executed First Come First Served or Round Robin. Priorities can be defined either internally or externally.

C. Task based Job Scheduling Algorithm

The efficiency of task scheduling directly affects the performance of the system. Many optimization algorithms have been applied to solve this problem. But this algorithm has introduced a main advantage that tasks are limited for particular time interval.
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V. CONCLUSION AND FUTURE SCOPE

Most data centers, by design, consume vast amounts of energy in an incongruously wasteful manner, interviews and documents show. As a result, data centers can waste 90 percent or more of the electricity they pull off the grid, there more power consumption and wastage of time. So there is a strong need of optimization above three factors CPU utilization, response time and no. Of jobs executed per time. The current research concern is the unwanted power utilized, energy consumed and more time consumed in data center which is exceptionally gaining attention of researchers with respect to scheduling of the computing resources. So this paper reviews the problem of scheduling and various scheduling algorithms that has been used in previous years to solve above mentioned problem. Future work includes the use of new scheduling algorithms like least slack time, multilevel queue scheduling algorithm or hybridization of above mentioned algorithms.

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