An Energy Efficient Multi Thread Job Scheduling Approach to Reduce the Energy Consumption over the Cloud Network

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Abstract - Cloud computing is a collection of computing resources provided with the help of Internet. It provides various services as utility and follows pay-as you- go model**.** Job scheduling plays a vital role in cloud computing systems. Job Scheduling is a process of providing system resources to many different tasks by an OS. In this research proposal, we will deploy hybridization of weighted round robin and Pthread scheduling algorithm to achieve overhead problem. Mainstream of the prior investigation work done in this area of analyzing power/ energy utilization mainly based on Job scheduling   with respect to Job allocation among the application servers, directed power saving and hybridization of weighted round robin and Pthread scheduling algorithm only. We compare the proposed work performance parameters like throughput, energy and time with existing work.

Keywords: Cloud Computing, Job Scheduling, Weighted Round Robin algorithm, Pthread algorithm.

I.   INTRODUCTION

Cloud computing is a platform for hosting an immense number of applications and computing services that will continuously change due to a large number of jobs randomly submitted by the end user. Cloud computing is an important developing field in Computer Science and Information Technology. It provides services to users on demand..Cloud computing is a fast growing area in computing research today. IaaS, SaaS, and PaaS are three main services provided by cloud computing. By using cloud, users do not require to install and maintain their own infrastructure and users can use cloud computing resources on demand as per their requirement. In Infrastructure as Service model of the cloud computing, the cloud provider provides computing, networking, and storage capabilities to users through Virtual Machines. Each Virtual Machine (VM) specifies certain amounts of CPU, memory, storage, etc. The users can make request to multiple Virtual Machine types depending on their needs. Cloud computing [1] is a recent distributed based computing model and it is attracted by customer due to save the energy with the help of central management of resources.

This model occupies a major part in energy efficient mechanism. Cloud Computing is a lease based [2] application that provide quality service in terms of user agreement.

Job scheduling is the process that allocates system resources to many different jobs or tasks by an operating system (OS). The system handles   job queues according to their priority that are awaiting CPU time. The Job management is an important concept of cloud computing systems. Job scheduling   identifies the effectiveness of the entire cloud computing framework[3]. Job scheduling can be defined as a mapping from clients' assignments to the proper allocation of resources & its execution. Job streams and procedures can set up every day, every week, month to month, and yearly , and keep running on-interest jobs without any help from support staff [4]

Various schemes are used to decide order of execution of jobs . Parameters that might be considered include:

- Priority of the job
- Availability of computer resource
- Execution time allocated to user
- How many simultaneous jobs allowed for a user
- Execution time estimation
- Peripheral devices availability
- Occurrence of prescribed events
- Dependency of job

II.   LITERATURE SURVEY

VaishaliChaharet.al(2013)[5] Multilevel Queuing & Multilevel Feedback Queuing is common in the CPU scheduling methods used in operating systems. These methods are common but still have some subjects & have a wide scope of development. Very less literature review is near on these scheduling techniques. So in this paper dissimilar methods for scheduling these techniques future by different authors has been composed & discussed.

RajveerKauret.al(2014)[6] Cloud computing is rich day by day & it will carry on in just beginning phase until computer & internet era is in endurance. While commerce with cloud computing, a numeral of matter are face up to like weighty load or transfer while computation. Job scheduling is single of the answer to these matter. It is the process of map job to available resource. In section (1) converse about cloud computing & scheduling. In part (2) give details about job scheduling in cloud computing. In part (3) accessible algorithms for job scheduling are discuss, part (4) existing algorithms are compared & lastly part (5) conclusion & future work are discussed.

M.Sheikhalishahi et al [7],2011 proposed multi-level and general-purpose scheduling approach for energy efficient computing through software part of the green computing. The consolidation are well defined for IaaS cloud paradigm, however it is not limited to IaaS cloud model. The policies, models, algorithms and cloud pricing strategies are being discussed in general. The solutions in the context of Hazier are shown, through experiments. The big improvement in utilization and energy consumption is found as workloads are running with lower frequencies. The coincidence of energy consumption and utilization is improved.

Jiandun Li et al [8],2011, 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 minimized response time in their algorithm.

Jiandun Li et al [9],2011, 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.

LipsaTripathyet.al[10](2014) Cloud computing is an increasing knowledge. It way huge quantity of data so preparation apparatus workings as a very important role in the cloud computing. Thus my procedure is projected to diminish the switch time, get superior the supply operation & also pick up the lavender maître d' production & throughput. This method or process is based on preparation the job in the cloud & to decide the disadvantage in the breathing protocols. Here allocate the main concern to the job which give better presentation to the processor & try my best to reduce the to come time & control time. Best effort has been made to direct the scheduling of jobs for solving disadvantage of breathing protocols & also manage the capability & throughput of the wine waiter.

UweSchwiegelshohnet.al(2010)[14]proposed scheduling system for set jobs on mainly similar processor architectures. stern disintegration is banned by using band scheduling which is simply begin by exceedingly similar work. Good most terrible case presentation of the scheduling go toward has previously been demonstrated by theoretical analysis. In this broadsheet we illustrate by reproduction with genuine workload data that the algorithm is also fitting to be functional in actual equivalent computers. This grasp for some dissimilar scheduling criterion like create span or figure of the own period. An simulation is also worn for decide of the best stricture set for the original system.

III.IMPROVED TECHNIQUE
The allocation of resources of the system to various tasks, known as job scheduling. Job scheduling is performed using job schedulers. Job schedulers are the programs having ability to start and control the jobs automatically by running prepared job-control-language statements. Scheduling is the biggest challenge in the field of cloud computing. There are various techniques used for scheduling. In our research we use two scheduling techniques 1) Weighted round robin 2) Pthread algorithm to minimize the energy and execution time of the jobs.

1. *Weighted Round Robin:*
Weighted Round Robin(Referred WRR) is a common algorithm of network routing scheduling field , as in[11-12] , It refers to the allocation of some time to the required user at a fixed time, according to the weighted value of each piece of the transmission stream. Literature as in[13] proposed a priority based. Weighted Round Robin algorithm, the application in cloud computing has a very good improvement for the overall operating efficiency and fairness of the system.

All processes are given time on the processor in form of time slice in the job queue, thereby eliminating concern for starvation. It means that by using WRR scheduling algorithm no process can hold the CPU for extended periods of time. With time slice a weight value is assigned to each process and these processes are executed according to the weight factor.
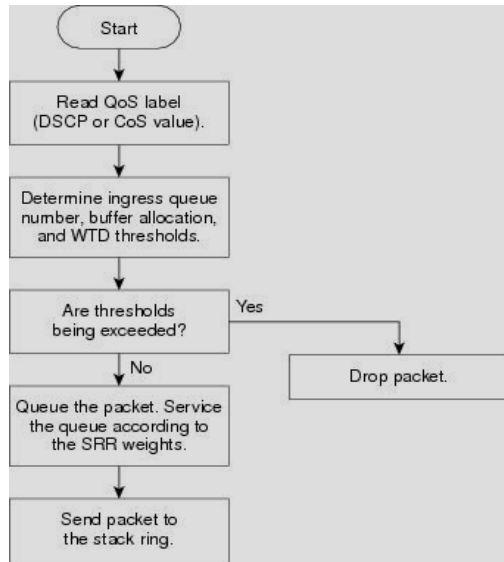
2.   *Pthread scheduling algorithm:*

Pthread scheduling algorithm is implemented on the inner part of the queue. It converts the jobs into small threads and these threads are executed parallaly.

POSIX Threads, usually known as **Pthreads**, is an execution model that exists independently. It allows a program to control multiple tasks of work . Each task of work is called a **thread** , and creation and control over these tasks is achieved by making calls to the POSIX Threads API.

The Pthreads library is a POSIX C API thread library that has standard functions for using threads across different platforms.

• The main purpose for using Pthreads is to achieve potential program performance gains.
• The creation and maintenance of threads is cost effective as compare to processes.
• All threads within a process share the same address space. So, it is easy to use .
• The most important reason for using Pthreads in multiprocessor environment is to take advantage of potential parallelism.
• Program must be organized into discrete, independent tasks that can execute concurrently to take the advantage of Pthreads.

IV.PROPOSED WORK

Proposed work reduces the energy and completion time of the jobs over the cloud network and compare the proposed work performance with existing work. Methodology used in our research work:

Start: Initialize all the processes and scheduling technique for create scheduling environment done in this phase. Here it is responsible for create memory locations for allotment and management during their execution.

Create Tasks: This phase creates input for scheduler as various types of tasks. Tasks is a type of operation in processing environment having some specification and consume energy over a server in cloud computing.

Create System: Systems are backend processing server deployed via admin to process user queries. The network of servers used to process a heavy load over a cloud network. Servers are also having specifications like ram and processor power and storage structure.

Deploy: Deployment is basically live the entire server in real time so that they can process user queries. Servers create a network to execute heavy load over a cloud environment. Scheduler divide load in between all the servers and execute fast instead on single processor.

Bind: This process used to create inner bound in between all servers and create a common processing environment. This process makes the system reliable and faster. All the systems and their status calculate with a single message with the help of this structure.

Processes & queues: Get Input from the various user and design session queues done here. Session queues used to handle various users and bind their tasks to manage their output. Session queues are basically tasks from a particular user in cloud environment.

Execution Structure: Execution structure designed with weighted round robin. This phase execute all the queues on cloud server and process faster as compared to other traditional techniques. This process reduces waiting time and energy consumption of all the tasks in the network.

Execution inner pattern: Execution pattern is basically design with the help of PTHREAD algorithm to execute all processes of a particular queue on same time. This process generates threads of all the processes and executes them on server.

Load balancer: Load balancer used to handle load on network. It divides tasks on network equally so that the entire server utilize properly and faster with less energy consumption. This process reduce system crashes and response in cloud computing.

MPI : Message passing interface is a technique to handle vacant systems in the network. This process passes a message over a network and design a table of systems for calls them in

process execution. It reduces scheduler's time to search and select system from a particular network.

Process deployment: After setting all the phases in cloud environment, process deployment starts to execute tasks on network.

Stop: This phase clear all the objects from memory and boost up their performance form next execution. It's a kind of dynamic memory allocation on a cloud server.

V. RESULT AND DISCUSSION

FCFS Algorithm:
First come first serve (FCFS) – first choice is a scheduling algorithm in which processes are executed according to their arrival time on the ready queue. With FCFS what comes first is handles first.

RESULT WITH FCFS
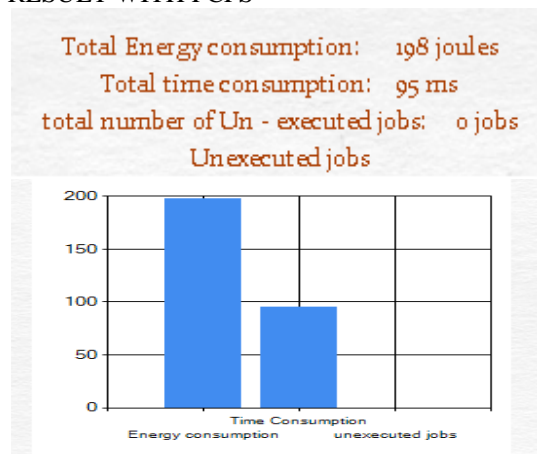
Fig: 5.2 Result FCFS

BASE PAPER ALGORITHM:

In this method the jobs are executed according to the burst time. All the jobs are divided into three parts:

1. In the small queue first 40% of jobs are stored.
2. In the medium queue next 40% of jobs are stored.
3. In the long queue remaining 20% jobs are stored.
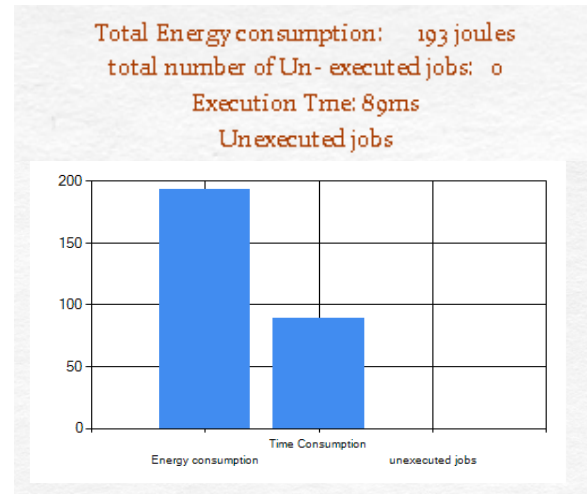
The jobs are randomly selected for the execution.

Fig:5.3 Result Base Paper

Proposed Algorithm (WRR +Pthread) This proposed algorithm is a hybrid algorithm , WEIGHTED ROUND ROBIN works on outer module. Pthread works on inner module.
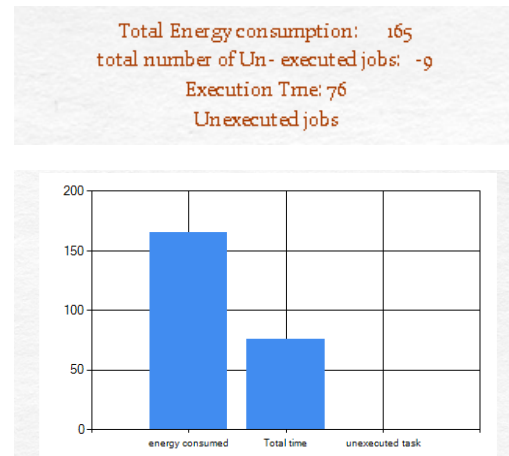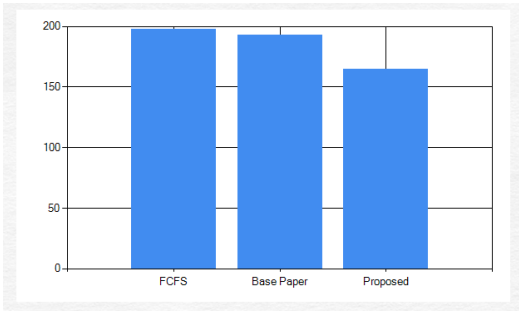

Fig.5.4 Result proposed

Comparison:
Diagram showing the relation and comparison between algorithms. FCFS, Base Paper, and Proposed.

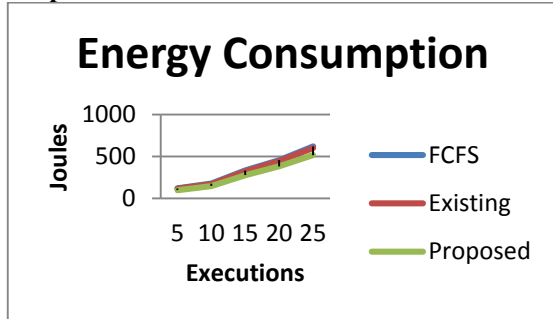| Number_of_Jobs	Number_of_Systems	Energy_Consumption	Algorithm
6	7	198	FCFS
6	7	193	Base Paper
6	7	165	proposed

Graphs:

Fig. Graph of Energy Consumption

Energy consumption of various techniques is shown in this figure. Here the proposed technique performing better than other existing techniques. It saves more energy during executions of different work load. Overall performance of this techniques is to less expensive during the uses on cloud network under millions of users.
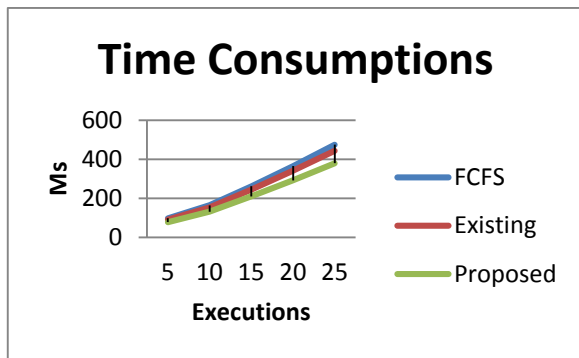

Fig.5.5(B) Graph of Time

Time consumption of various techniques is shown in this figure. Here the proposed technique performing better than other existing techniques. It provide fastest response with efficient use of multiple queue handling and inner structure of queues during execution.

VI.CONCLUSION

Cloud computing is working with heavy load on their data centers. Due to bad jobs scheduling approaches this network become more cost effective over a cloud network and it consumes more energy .Existing approaches taking too much time to get the jobs complete on cloud network due to some problems like un-managed priorities of jobs & their distribution, less amount of utilization & some others. Proposed approach uses the weighted round robin and pthread algorithm to reduce energy and time consumption of jobs. It will also reduce the load of data center in worst cases when number of users will be more than limit of a network.

The overall performance of weighted round robin & Pthread scheduling algorithms is affected by a number of the factors, such as imbalance of scheduler among the processor & scheduling overheads. To analyze the performance using parameters time and energy consumption are implemented on weighted round robin and Pthread scheduling multiprocessor architecture. It reduce the energy consumption and time consumption over multiple request and processor in cloud environment.

In future it can be extended for more number of nodes. So that more number of instances can be created &more compute intensive functions can be run on the designed cloud computing system.

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