

“Job Scheduling algorithm in Cloud Computing” - A Survey

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Abstract - Cloud computing is latest technology which is very popular in days and it will continue in developing phase until computers and internet era is in existence. While deal with cloud computing a number of issues are there like heavy load or traffic while computation. Job scheduling is one of the salutation for these issues. It is the process of mapping task to available resource. The aim of job scheduling in cloud computing is achieving highly system throughput and to allocate different computing resources to applications. The Complexity of scheduling problem increases with the size of the task and becomes highly difficult to solve effectively. In this paper surveys the existing different type of job scheduling algorithms in cloud computing and summarized some method to improve the performance of job scheduling.

Index Terms–Survey, Cloud Computing, Job Scheduling.

Introduction

Cloud Computing

Cloud computing is a technique of enabling convenient, on-demand network access to shared pool of configured computing resources which can rapidly provisioned and released with minimum management effort or service provider’s interaction. In cloud computing, the word cloud is used as “the internet” so thecloud computingmeans“Internet based computing” where different services like servers, storage and applications are delivered to an organization's computers and devices through the Internet.To gain the maximum benefit of cloud computing, developers must have to design mechanism that optimize the use of architectural and deployment paradigms.

Three type of cloud

1. **Private Cloud:**The cloud is deploy by the private organization for own requirements. This type is limited to the access for a specific group. Services are design for private benefits called as private cloud that can be one house, organizational cloud.
2. **Public Cloud:** The cloud is created for general purpose where rent basis services are provided to the public. This can be accessed by any user. Charges are applied to the client on behalf of service utilization.
3. **Hybrid Cloud:** The combination of the private cloud and public cloud is known as hybrid cloud. This is done when private cloud need some special kind of services from public cloud.

Cloud Computing services divided into three broad categories

In cloud computing, there are three types of cloud services which is given by cloud provider. These services are root execution of cloud computing. So whenever an user need to perform any task, user able to select any services those mention follow:

1. **Software as a Service (SaaS):** In this, provider gives service to user for accessing the software to develop application where software is provided on monthly rent basis. More the user used it, more he will be billed.Goggle app software is provided for a certain time to develop application. In this, a user has the least control over the cloud.Someexamples of IaaS serviceare Amazon Elastic Compute Cloud (EC2),Eucalyptus,Go Grid.
2. **Platform as a Service (PaaS):** It is developed above the SaaS level and services are given to clients with access to the operating system as well as basic operating software to use software applications. It provides all the resources needed to build an application. For example for accessing database and payment services there is no need to purchase or maintain & manage the existing computing infrastructure. Like as Google App Engine allows clients to run their web applications (software that can be accessed using a web browser such as goggle chrome over the internet) [6] on Google’s infrastructure. Some examples of PaaS services are Force.com, Go Grid Cloud Center, Google App Engine, Windows Azure Platform.
3. **Infrastructure as a Service (IaaS):** It offers an infrastructure to the client. It allows clients with the access to server hardware, storage, bandwidth and other basic needs for computing resources. For example, Amazon EC2 allows individuals and businesses to rent machines preconfigured with selected operating systems [6] to run their own applications.Some examples of SaaS cloud service providers are GoogleApps, Oracle On Demand, Salesforce.com, SQL Azure

The three different service models taken together have come to be known as the SPI model ofcloud computing. Many other service models have been mentioned: StaaS, Storage as a Service; IaaS, Identity as a Service CaaS, Compliance as a Service and so forth. However, the SPI services encompass all the other possibilities.(a browser, usually), and the customer’s responsibility begins and ends

with entering and managing its data and user interaction. Everything from the application down to the infrastructure is the vendor's responsibility.

Related Work

Job Scheduling

In cloud computing, Job scheduling is the fundamental concept of cloud computing systems task scheduling problems are main which relates to the efficiency of the whole cloud computing system. Job scheduling is a mapping mechanism from users' tasks to the appropriate selection of resources and its execution. Job scheduling is flexible and convenient. Jobs and job streams can be scheduled to run whenever required, based on business functions, needs, and priorities. Job streams and processes can set up daily, weekly, monthly, and yearly in advance, and run on demand jobs without need for assistance from support staff.

There are some of characteristics of the Job Scheduling as [1] Job scheduling is global centralized-As cloud computing is a computing model which supply the centralized resource by the mirror service to multiple distributed applications, and this mirroring deployment can make heterogeneous procedures executing of interoperate become easier, which is used to be difficult to deal with. Therefore, virtualized technology and mirroring services make the task scheduling of cloud computing achieve a global centralized scheduling[2] Each node in the cloud is independent – In cloud computing, the internal scheduling of every cloud node is autonomous, and the schedulers in the cloud will not interfere with the scheduling policy of these nodes.[3]The scalability of job scheduling - The scale of resources supply from cloud provider may be limited in early stages. With the addition of a variety of computing resources, the size of the abstract virtual resources may become large, and the application demand continues increasing. In the cloud, task scheduling must meet the scalability features, so that the throughput of the task scheduling in the cloud may not be too low[4]Job scheduling can be dynamically self-adaptiveExpanding and shrinking applications in the cloud may be necessary depend on the requirement. The virtual computing resources in cloud system may also expand or shrink at the same time. The resources are constantly changing, some resources may fails, new resources may join in the clouds or restart.

There are different types of algorithm used for Job scheduling

- FCFS(First Come First Serve):In first come first serve job scheduling the arrival time of jobs are queued in the order of which come first.
- SJF(Shortest Job First): In Shortest Job First they give more priority to small jobs, medium and long jobs are executed after the execution of small jobs.
- RR(Round Robin): In Round Robin scheduling jobs are dispatched in FCFS logic and the time slice of the process decide the allocation. The process does not terminate with in the scheduled time the next job is waiting in the queue.

Literature Review

Secondary Job Scheduling in the Cloud with Deadlines

In this paper they are consider the problem of secondary job scheduling in cloud with dead line which reduces online and offline job scheduling problem. In Online there are two more approaches are there: 1.Under loaded system they used EDF(Earliest deadline first algorithm). 2. Over loaded they used V-DOVER algorithm. For offline transformation of the processor capacity and job parameters is proposed to reduce the offline problems with time-varying capacity to that constant capacity.

Improving scheduling of backfill algorithms using balanced spiral method for cloud metascheduler

In this paper ,it is attempted to employ improve backfill algorithm using balanced spiral (BS) method[2] implementation in cloud metascheduler to solve the cloud scheduling problem with multiple objectives. The dynamic metascheduler which deploy the job using improved backfill for cloud environment.

Rescheduling Co-Allocation Requests based on Flexible Advance Reservations and Processor Remapping

This shown the impact of rescheduling co-allocation requests in environments where resource providers deal with inaccurate runtime estimations. As local jobs are not able to fill all the fragments in the scheduling queues, the co-allocation requests should not be based on rigid advance reservations.The FlexCo model relies on shifting of advance reservations and processor remapping. These operations allow the rescheduling of co-allocation requests, therefore overcoming the limitations of existing solutions in terms of response time guarantees and fragmentation reduction.

Achieving Service Level Agreement in Cloud Environment using Job Prioritization in Hierarchical Scheduling

In this Hierarchical scheduling is presented. It helps achieving SLA with fast response. In this response time is achieved by executing the high priority jobs (deadline based jobs) first by estimating job completion time.Hierarchical scheduling with job prioritization is used to give more priority for deadline based jobs. This approach satisfy the service consumer and meet the SLA by increasing the performance of the scheduling algorithm.Hierarchical scheduling with job prioritization is used to give more priority for deadline based jobs. This approach satisfy the service consumer and meet the SLA by increasing the performance of the scheduling algorithm.

An Efficient Multi Queue Job Scheduling for Cloud Computing

In this multi queue job scheduling algorithms based on burst time using dynamic job selection for cloud computing. They defined three different queue small, medium, large. The queuing method has increased the satisfaction of the user and utilizes the free unused space of resources for increased performance. A Multi Queue Scheduling (MQS) algorithm proposed to reduce the cost of both reservation and on-demand plans using the global scheduler.

Conclusion

Cloud computing technology is increasingly used in organizations and business markets. And Job scheduling is the key problem in cloud computing. There are many algorithms for job scheduling based on different strategies. But not sufficient to solve the larger job in queue. In this the queue will work on burst time. All these algorithms give priority in terms of the ascending order. Based on their own results, it is shown that some of the scheduling algorithms are beneficial to be used in Cloud computing. And there is not a single scheduling algorithm which can solve the problem of various types of services. Because selection of job scheduling algorithms depends on personal reference and on the problem to be solved.

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