

A Survey Paper on ‘An Improved Resource Scheduling Approach using Dynamic Job Grouping Strategy in Grid Computing’

Monica H. Santoki¹

¹Department of Computer Science and Engineering
¹Gujarat Technological University, Ahmedabad, Gujarat

Abstract— Grid computing is one type of wide-area distributed and heterogeneous system. Grid resource scheduling is one challenging task or say one issue for scheduling resources. Job scheduling means that light-weight jobs are grouped in course-grain jobs. So many different scheduling algorithms are used for grid resource scheduling. Mainly this algorithms are minimize the processing time, achieve high throughput and to maximize resource utilization. In order to ensure proper working of algorithm, the algorithm will be tested in Gridsim toolkit. Gridsim toolkit mainly used for modeling and simulation purpose.

Key words: Grid computing, Job scheduling, Resource scheduling

I. INTRODUCTION

The purpose of this paper is to reduce the processing time, processing cost, achieve high throughput, and maximum utilization of resources. For running applications, resource management, scheduling is issues for grid computing. So, different algorithms are used for improved this all performance. Here, describe different algorithms for scheduling.

II. BASIC GRID MODEL

The basic grid model generally composed of a number of hosts, each composed of several computational resources, which may be homogeneous or heterogeneous. The four basic building blocks of grid model are user, resource broker, grid information service (GIS) and lastly resources. When user requires high speed execution, the job is submitted to the broker in grid. Broker splits the job into various tasks and distributes to several resources according to user's requirements and availability of resources. GIS keeps the status information of all resources which helps the broker for scheduling.

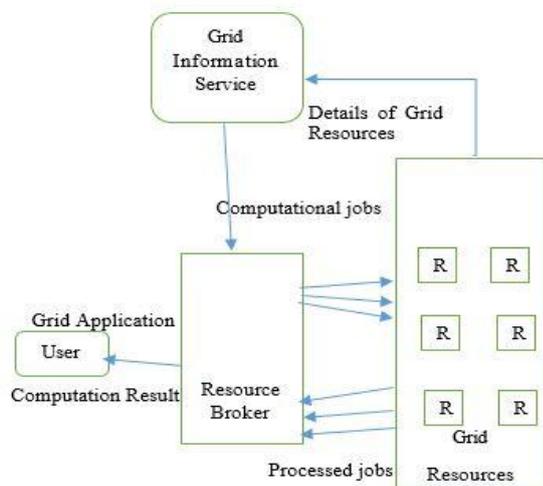


Figure 1 Basic Grid Model

III. JOB AND RESOURCE SCHEDULING ALGORITHMS

Job scheduling is the process of mapping jobs into specific available physical resources, trying to minimize some cost function specified by the user.

A. SFBAJG: Scheduling Framework For Bandwidth-Aware Job Grouping-Based Scheduling In Grid Computing [5]

In this algorithm, computational capabilities and the communication capabilities of the resources are considered. Priority of each resources are considered. Processing capabilities of resources is used. Scheduler select first resource and groups the job based on chosen resource processing capabilities. Finally, grouped job are assign to particular resource.

1) Advantages:

- Maximize resource utilization.
- Reduce processing time.
- Reduce network latencies.

2) Disadvantage:

- Memory size is not considered.
- Dynamic resource characteristics are not considered.
- Pre-processing time is high for job grouping and resource selection high [2].

B. GFJS: Grouping-based Fine-grained Job Scheduling in grid computing [5]

In this algorithm, light-weight jobs are formed into course-grain jobs and allocate the particular resources. Resources are based on processing capabilities and bandwidth. Processing capabilities in MIPS and bandwidth is measure in Mb/s. Grouping algorithm is used greedy algorithms and FCFS manner for improve the processing of light-weight jobs.

1) Advantages:

- Overhead time is reduced.
- Maximize resource utilization.
- Reduces execution time of jobs.
- Reduce network latency.
- Reduce total processing time.

2) Disadvantages:

- Not consider memory size.
- Pre-processing time of job groping is high.

C. GBJS: Grouping-Based Job Scheduling Model In Grid Computing [2]

In this algorithm, light-weight jobs are grouped into course-grain jobs and allocated to resources. This algorithm includes bandwidth, memory size, processing power is considered.

1) Advantages:

- Reduce processing time.
- Memory size is considered.
- Reduced waiting time of grouping job.

2) *Disadvantages:*

- Parallel scheduler is not work.

D. DJGBS: A Dynamic Job Grouping-Based scheduling for Deploying Applications with Fine -Grained Tasks on Global Grids [5]

In this algorithm, Jobs are grouped according to MIPS of resource. Select resource in FCSS manner and multiply granularity size for increased resource computational time.

$$\text{Group_job_MI} < \text{Resource_MIPS}$$

If above condition is satisfied then assign another job. This process is continuing until Resource_MIPS < Group_job and last job MI is removed and stop grouping of job. After finally job grouped it send to the particular resource.

1) *Advantages:*

- Reduced total processing time.
- Maximize resource utilization.

2) *Disadvantages:*

- Dynamic resource characteristics are not considered.
- Not consider memory size
- Not consider bandwidth.

E. IRSJGS: An Improved resource Scheduling Approach Using Job Grouping strategy in grid computing [4]

In this algorithm, model hierarchical model is used and it is dividing into 3 levels:

- User level
- Global level
- Local level

User submits the application at user level through scheduler into grid environment, scheduler gets the information about grid resources from GIS. GIS contains resource table and grid monitor. GIS sends the status of resource to the scheduler. Grid monitor is monitor the grid system process. Application is submitted into grid at the global level, it finds computational power and select high computational power is selected. Total computational power is higher than submitted application then next application is selected. The same process repeated until total computational power requirements of the application in that group is less than or equal to available computational power of selected cluster.

After submission of application local level scheduling is done. Global level scheduling will make the grid load balanced across the clusters and local level scheduling will make the clusters load balanced across the nodes [4]. Local scheduling works to maximize resource utilization reduced processing time and balanced the load. Local scheduler searches computational power of all available nodes within cluster and schedule the jobs according to Best Fit Policy [4]. Job scheduling implement parallel jobs and this scheduler schedule only limited number of jobs using best fit policy. Other jobs are assign Round-Robin fashion and start from lightly loaded node.

1) *Advantages:*

- Reduced processing time.
- Maximize resource utilization.
- Load balancing is done.

2) *Disadvantages:*

- Bandwidth is not considered.

F. PEBGQOS: Priority Enhanced Business Grid Quality of Service[6]

In this algorithm, priority is considering base on QOS parameters. In agent based Job distribution strategy task agent receives the number of jobs from the user level and placed in the queue [6]. The number of queues in global level are based on the priority classification [6]. Priority 0 to 4 place on queue 1, 5 to 9 place on queue 2 and last 10 to 14 place in queue 3. Suppose queue is not empty then distribute the tasks to the computational nodes of a grid. Priority of job scheduling is done in local level. This is based on task priority. Allocate resource to the task has highest priority.

If two or more tasks have same priority that time tasks are sort on task demand and process that has shortest runtime are allocate to resource.

If some time, two or more tasks have same priority and same resource demand then allocation of resource to tasks are based on FCFS (First come first served) manner.

1) *Advantages:*

- Good makespan [6].

G. BAJGBS: A Bandwidth-Aware Job Grouping-Based Scheduling on Grid Environment [5]

In this algorithm, MIPS and bandwidth of resource is used as schedule the jobs. All jobs are grouped then it is allocated to resource. After, grouping the jobs grouped jobs are send to allocated resource based on Largest Job First[5], results of processing are sent back to user. It is not consider only computational capabilities but also the communication capabilities are used.

1) *Advantages:*

- Maximize resource utilization.
- Reduced processing time.

2) *Disadvantages:*

- Dynamic resource characteristics are not considered.
- The bandwidth strategy is not ensuring that the resource having a sufficient bandwidth to send the group job with required time[3].

H. CBJRS: Constraint-Based Job and Resource scheduling in Grid Computing[1]

In this algorithm, resources scheduling are arranged in hierarchical manner and Heap sort tree (HST) is used for arranging the resources. High computational power of resources is put on root node. Processing capabilities, bandwidth, and memory size is required for available resources. Group the jobs, and achieve high throughput.

1) *Advantages:*

- Reduced processing time.
- Maximize resource utilization.

2) *Disadvantages:*

- Not worked as parallel grid scheduler

Algorithm	Architecture	Environment	R T	R U	L B	DY
DJGBS	D	HE	HI	HI	HI	HI
SFBAJG	H	HE	HI	HI	L O	AV G
BAJGBS	D	HE	HI	HI	HI	HI
GFJS	D	HE	HI	HI	HI	HI

Table 1: Comparison Table of Scheduling algorithms

Where, D=Distributed, H=Hierarchical, HE=heterogeneous, RT=Response Time, HI=High, RU=Resource Utilization, LB=Load Balance, LO=Low, DY=Dynamicity, AVG=Average

IV. CONCLUSION

In this paper, various scheduling algorithms in grid computing have been surveyed. In paper also give advantages and disadvantages of all scheduling algorithms. To study all algorithms and also implement in Gridsim toolkit

ACKNOWLEDGEMENT

This work was greatly supported by Gujarat Technological University and L.J. Institute of Engineering & Technology, Ahmedabad by providing the guidance and support for computer department.

REFERENCES

- [1] Vishnu Kant Soni, Raksha Sharma, ManojKumar Mishra, Sarita Das," Constraint-Based Job and Resource scheduling in Grid Computing", IEEE,2010,Page(s):334-337
- [2] Vishnu Kant Soni, Raksha Sharma, Manoj Kumar Mishra," Grouping-Based Job Scheduling Model In Grid Computing", World Academy of Science, Engineering and Technology 41 2010,Page(s):781-784
- [3] Raksha Sharma, Vishnu Kant Soni, Manoj Kumar Mishra, Prachet Bhuyan," A Survey of Job Scheduling and ResourceManagement in Grid Computing", World Academy of Science, Engineering and Technology ,Vol:4 2010-04-22,Page(s):400-405
- [4] Raksha Sharma, Vishnu Kant Soni, Manoj Kumar Mishra," An Improved Resource Scheduling Approach Using Job Grouping strategy in Grid Computing", 2010 International Coriference on Educational and Network Technology (ICENT 2010),IEEE,Page(s):94-96
- [5] Vishnu Kant Soni, Raksha Sharma, Manoj Kumar Mishra," An Analysis of Various Job Scheduling Strategies in Grid Computing", 2010 2nd International Conference on Signal Processing Systems (ICSPS),IEEE,Page(s):V2-162-V2-166
- [6] Rency rajan, G.K.Kamalam," Priority Based Heuristic Job Scheduling AlgorithmFor The Computational Grid",IEEE,2013,Page(s): 448-451