www.ijecs.in
International Journal Of Engineering And Computer Science ISSN:2319-7242
Volume 6 Issue 7 July 2017, Page No. 22045-22048
Index Copernicus value (2015): 58.10 DOI: 10.18535/ijecs/v6i7.25

A Taxonomy Of Efficient Hierarchical Parallel Algorithms Using Grid Computing

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Abstract: Grid computing is effective and purely dispersed body that gives a highly assessed computing platform that resolve the high level of difficulties through allocation and distribution of computational ability. Yet Ant Colony algorithm for Optimization has the ability to give an optimized result in grid computing background then other algorithms but it does not give the assurance to give proper results when it executed for many time. Ant Colony algorithm provides improbability in merging time to the deviation in the size of the problem and has opposing results onto the program effectiveness. This algorithm lacks organized initial values because of the unsystematic initialization. This assumption defines about poorly chosen values will lead to bad solutions. In the proposed algorithm scheduling of autonomous jobs are selected. In this procedure at one time only one job is selected and proceeds for execution on the main server. If this main server is failed while executing then server is rejected. We have calculated the performance of these algorithms such as FCFS/FF, SJF/FF, LJF/FF and metaheuristic algorithm Ant Colony Optimization for job scheduling and draw comparison between proposed technique

KEYWORDS: Grid, PSO, FCFS, Scheduling.

1. INTRODUCTION

Grid is the worldly dispersed network of computational services that gives vibrant, synchronized, reliable and trustworthy computing way to provide secure execution of many different services. Grid based computing emphases on estimating the job execution problems through futile CPU circle which are not easily determined by using individual computer systems. It reduces the cost of program efficiency and throughput in terms of turn-around time. Researchers stated that grid is technique of geologically allocated jobs to computer systems, connected through the internet server, that are established to make simulated computer systems including a variety of researches made to resolve problems by using electronic and Scientific method in small time epoch rather than predictable network servers. Due to establishment of highly valued particles which have the ability to executed these job efficiently and while executing big lose has practiced in result of the enactment of service routines, customer may transfer the control to another server for execution and then again execute that job on new server. When this job have effectively executed on new server, server can obtain the final solution and give this result to the customer. Grid computing framework has given below in Fig.1.1 that described the functioning of execution of the jobs in grid computing environment.

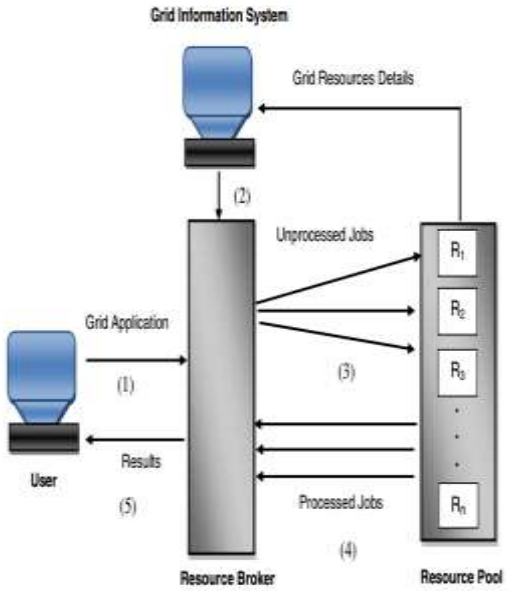

Fig.1.1 Grid structure

Grid mainly depends upon the various modules like computational circles, storage memory, commercial strategies, procedures, facts and many others. Relying upon requirement of program, clients requirement for various services. Because of an increase in prominence of Grid

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computing services and plea of its computational devices, the dynamic, robust and adaptable job distribution have a major impact. Carefully mixing the constrained Grid service together to accomplish requirements of the job and accomplishment of execution of resources is the chief target.

The essential part of performance is the distribution of the resources as well as the selecting the jobs. Fig.1.2 described the modification of grid services. Grid computing technique, grid server make interconnection to client side to give detail

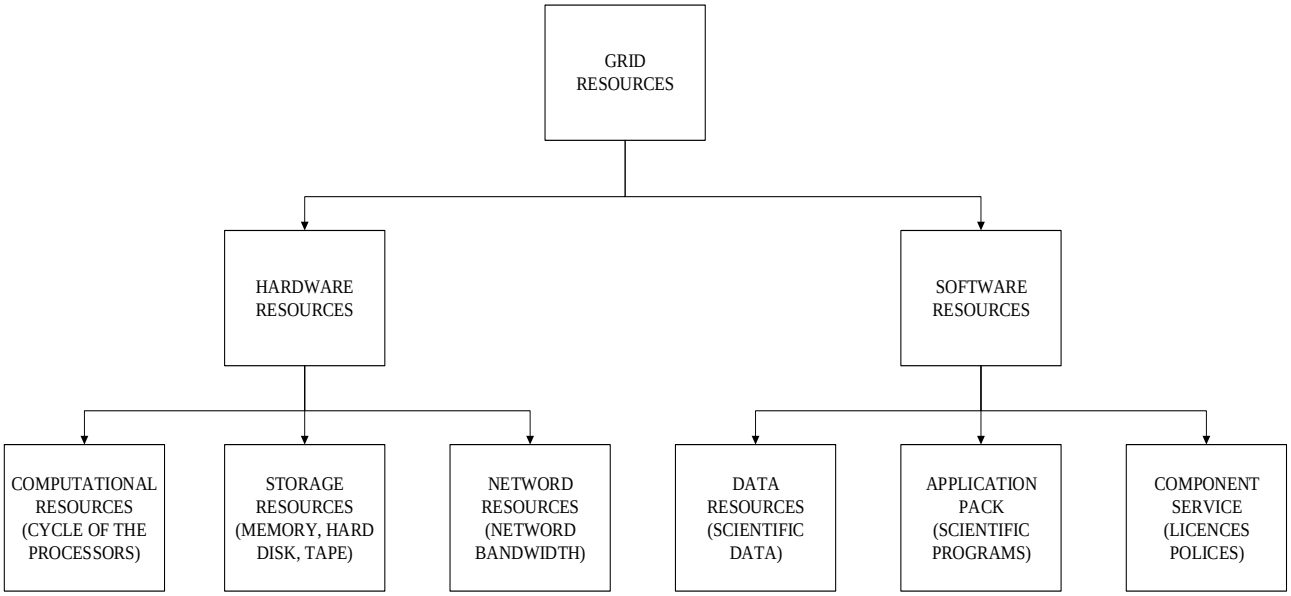

Fig.1.2 Expansion of grid assets

About the assets to be used and gathering data related to assets by considering the requirements for execution of the resources based on Grid information system. Agent finds this information by submitting the resources.

2. RELATED SUREY

Kannan Govindarajan et al (2016) defined system that has the ability to enhance client side services in the direction of a identified result. Moreover, it is incorporated with grid algorithm Particle Swarm Optimization depend upon the services of that application and assets choosing method that gathers from the algorithm of Swarm Intelligence. Nan Zhao et al (2016) proposed algorithms that define a protocol with profile platform and chosen services procedure for every acquiesced highly required data for that application and chose the cloud sources out of the given source grade that is available due to cloud sources in an ideal routine. Ariyasingha IDID et al (2015) is to analyses the multi-objective ant colony optimization (MOACO) algorithms and simulate their results and compare performances with various types of ants and various types of repetitions. Shakya S et al (2015) discuss about how to perform parallelism simulation and perform various operative problems.

3. SIMULATION RESULTS AND COMPARISION

Simulation is executed in MATALAB framework. In the proposed technique, n no. of independent-rigid-jobs is to be processed by m no. of non-identical parallel servers. Let b_{ij} is the burst time of j^{th}job to be processed on i^{th}server where j=1,2,3…..n and i=1,2,3……m, $\{r_1, r_2, r_3 \ldots\ldots r_n\}$ be the resource requirement of set of n jobs and $\{s_1, s_2, s_3 \ldots \ldots s_m\}$ be the no. of resources possessed by m no. of servers. It is assumed that servers are divides into three classes $\{C_1, C_2, C_3\}$with allocated speed $\{1,2,3\}$. Let server 1 belongs to C_2 class with computation speed 2 then time taken by server 1 to process j^{th} job will be $b_{1,j}/2$. One server can execute only one job at single time. The parameter values used by **PSACGA** algorithm are in table 3.1.

Parameter	Value	Description
R	0.8	Evaporation Rate
A	1.6	Pheromone value
B	3	Heuristic Information
NC	12	Number of iterations
N	32	Number of ants

Table.3.1 Parameter values

The algorithm is run 10 times to calculate average makespan, average flowtime and average waiting time. Comparison is drawn considering cases:

- Vary number of jobs and vary number of servers.
- Fix number of jobs and vary number of servers.
- Vary number of jobs and fix number of servers.

For all the three cases, different variations can be noticed in average waiting time, average make span and average flow time. This indicates that m no. of jobs can be executed in parallel fashion at one instance. Server failure is not taken into consideration.

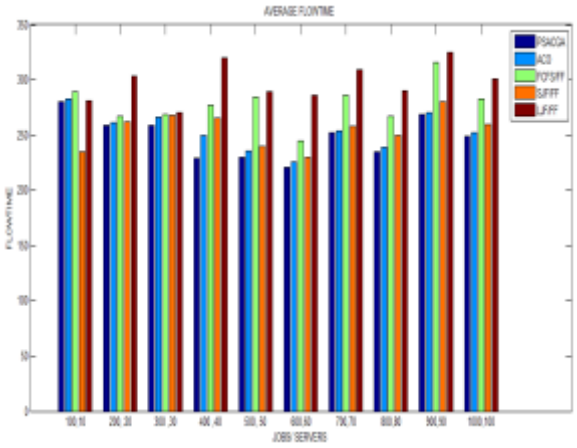

Fig.3.1 Average Flowtime for varying jobs and server

The **PSACGA** algorithm is compared with Ant Colony Algorithm, FCFS/fastest fit, SJF/fastest fit, and LJF/fastest fit.

CONCLUSION

Grid research is understood to be geographically allocated computer systems, joined via the internet. Non pre-emptive jobs are considered, next job can only be executed when previous job has completed its execution. Owing to the heterogeneity of resources in grid, Scheduling associates with class of NP-hard problems due to which reaching optimal solution surpasses the time constrain. Heuristic and metaheuristic algorithms are preferably practiced to compromise with the complications of these problems and develop optimum or maybe near-optimum solutions. Scheduling deals with mapping of the jobs to servers represented by m*n matrix.

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