IJCSE International Journal of Computer Sciences and Engineering Open Access
Research Paper Volume-3, Issue-8 E-ISSN: 2347-2693

Performance Evaluation of FCFS and EBF in Linear and Non-Linear Gridlet Size

Neha Bhardwaj[1*], Karambir[2], Ajay Jangra[3]

[1*,2,3]*Department of Computer Engineering*
UIET, Kurukshetra University, Haryana, India

www.ijcseonline.org

Received: Jul /17/2015 Revised: Jul/30/2015 Accepted: Aug/25/2015 Published: Aug/30/ 2015

***Abstract*—** Grid computing define as the infrastructure in which hardware as well as software resources situated at different places; shared and uses by the different organizations which coordinated to provide consistent, pervasive and transparent access. Workflow is a set of task or subtasks having dependency among them. Resource allocation is one the objective of grid computing. Efficiently use of resources to run the workflow tasks in order to achieve maximum utilization of resources. Throughput is amount of information process in given amount of time. This parameter is mainly applied to various phenomenon's of networking systems. In this paper, first come first serve and easy backfilling algorithm performance evaluated on the basis of linear and non-linear increase in gridlet size and compare the result in both the cases. The results indicate that EBF has better resource utilization and throughput than FCFS.

***Keywords*—** Grid Computing; Workflow; Resource Utilization; Throughput.

I. INTRODUCTION

Grid computing is an IT infrastructure which changes computation and communication. Depending on the service various types of grid are present some of them are access grid, computational grid, data grid etc [1]. Computational Grids came into existence to solve the problem which require large amount of data. But there is difficulty that demand of computational power increases. Companies and administrations don't use their resources to their full utilization. The main purpose of computational grid is sharing of computational resources. e-Science Grids are used to find the solution of the problem arise in the field of science and engineering by accessing computational and data resource. Data grids manage the large amount of distributed data and handle its sharing and access of data. Data Grid provides the functionality of data repository. Replication algorithm has very important to improve the performance of grid. Also, To achieve the high throughput data copy and transfer is important. Enterprise Grids in today's era Grid computing is becoming a popular component of business as well. E- business easily respond to the demand of consumer and dynamically adjust the marketplace shifts [2].

In movies, like in spiderman there is many special effects which require huge amount of computation or CPU cycles. Requirement of huge amount of computation not only limited to the animation or special effects it's also require in the calculation of weather forecasting [3]. Grid computing is not a technology which has been from scratch but it is developed from the existing technology such as peer to peer, high performance, cluster computing, web service computing.

In fig.1, cluster computing and P-2-P has been evolved from distributed computing and high performance computing respectively. In cluster computing, different resources like server, machine etc. is connected for high performance computing. Parallel Programs for cluster computing has been written through MPI and PVM. In P-2-P, resources are shared by the peer computer or machines. Unstructured Peer to- Peer example is Guntella in which information are stored in heartbeat manner. Structured Peer-to- Peer uses mesh, ring [3]. Cluster and P2P computing on combination give the grid computing which is accepted as IT virtualization technology. In conceptual point of view, grid combines the main points of both cluster and P2P computing and web services [3].

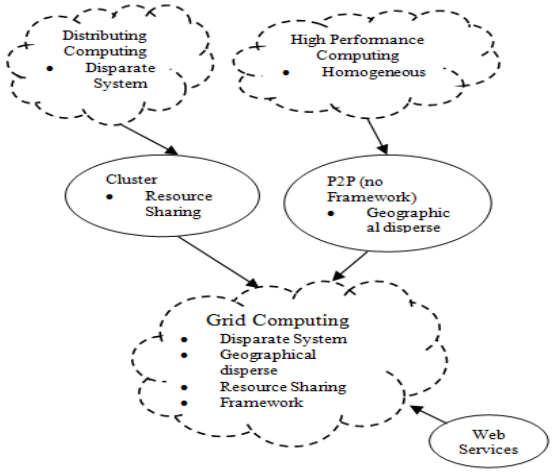

Fig.1 Evolution of Grid Computing [3]

Resource management is one of the challenge in grid which arises due to heterogeneity of resources and diversity of resources having different hardware and software [4]. A common problem arising in grid computing is to select the

most efficient resource to run particular program. Resource allocation has three phases:

- Resource discovery is the first phase in which candidate resources are selected from all the resources on the basis of resources information in the Grid Information services [5]. Resource registry handle and store the information of resources [6]. This phase include 3 steps: Authorization filtering, Application definition, Minimal application requirement.
- Second phase is system selection in which the resources which is best for the task execution are selected [7]. This phase includes 2 steps: Information gathering, System selection.
- Third phase is execution phase in which execution of job on selected resources in second phase and also monitor the execution [8]. This phase includes 6 steps: Advance reservation, Job submission, Preparation tasks, Monitoring progress, Job completion, Clean-up Tasks.

II. Related Work

In [9], resource allocation is challenge in the grid computing and proposed a dynamic allocation mechanism of resources. The dynamic allocation can be achieved by merging the concept of best fit algorithm and process migration.

In [10], proposed PRAG (preemptive resource allocation technique). By advance reservation and time limit addresses the problem occur in preemptive technique. Job scheduling was performed on the basis of advance reservation request and immediate reservation. This technique reduce the total time required in execution of job, waiting time and increase the resource utilization and maintain the load.

In [11], Grid system used in finding planet movies and in understanding the disease. Grid system als makes a remarkable job in business and in future develops method for service delivery. Question arises is What impact of resource allocation methodology on resource utilization and its performance?. Study allocation method by its characteristics and its effect on parameter i.e. resource utilization.

In [12], various method of security have in developed in for distributed and cluster computing having homogeneous. Bur, in heterogeneous we need complete attention of computation, resource allocation and security. In grid every resources have their own protocols and policy hence it provides various opportunities in resource sharing, utilization. Proposed various security mechanisms at different levels like resource level, service level, authentication level, information level and management level along with the consideration of load factor.

III. Resource Utilization and Throughput

Grid is a parallel and distributed computing that applies resources which are placed at different places within a network in order to solve complex scientific problems that require large amount processing cycles. Resources are allocated to resources in such a way so that resource utilization is maximum. Resource allocation is one the objective of grid computing. Efficiently use of resources to run the workflow tasks in order to achieve maximum utilization of resources. Sometimes resources are required to reserve in advance to implement the task of workflow.

Throughput is amount of information process in given amount of time. This parameter is mainly applied to various phenomenon's of networking systems. Various measures that are related to it some of them is speed through which workload has been executed; response time i.e. whole time between single interactive user request and response.

IV. Result and Analysis

Simulation is the process of showing the real world application behavior which cannot be possible to simulate in real world like grid computing, networking. GridSim simulation toolkit is used for result purpose.

Performance is evaluated of the FCFS and EBF algorithm on different gridlet size. In linear, size of gridlet varies from 1000 to 5000. In non-linear size of gridlet vary from 1000, 3000,6000,10000 and 17000.

- *Linearly Increase in Gridlet Size*

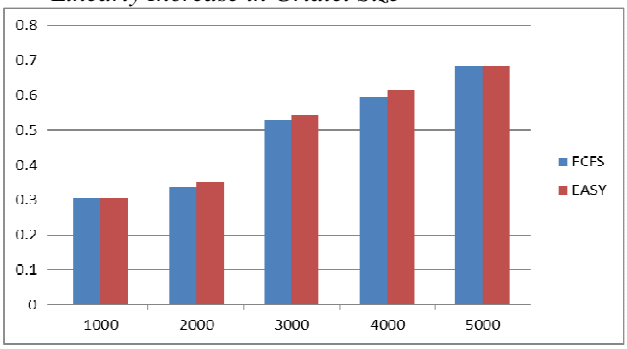

Fig.1 Average Utilization in FCFS based Policy with Various Gridlet Size

Results clearly indicate that efficient backfill is better than first come first serve policy for workflow based optimization in grid systems. Average resource utilization is improved in case of backfilling policy and increase as the gridlet size increase.

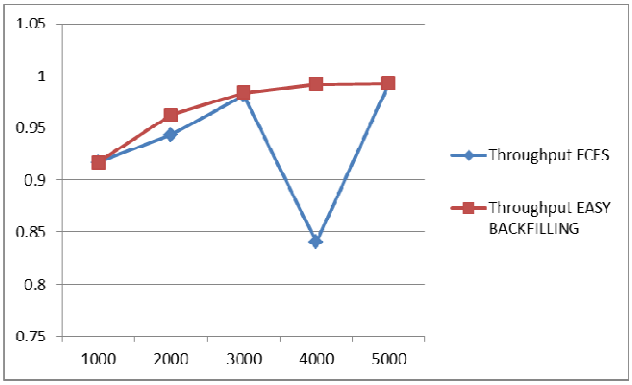

Fig.2 Comparison of Throughput FCFS and EBF

Results of fig.2 shows that the throughput is maximize in case of EBF from gridlet to 1000 to 5000 for workflow based optimization in grid system. Easy backfilling has better throughput than FCFS. Throughput is improved in case of backfilling policy and increase as the gridlet size increase.

- *Non-Linearly Increase in Gridlet Size*

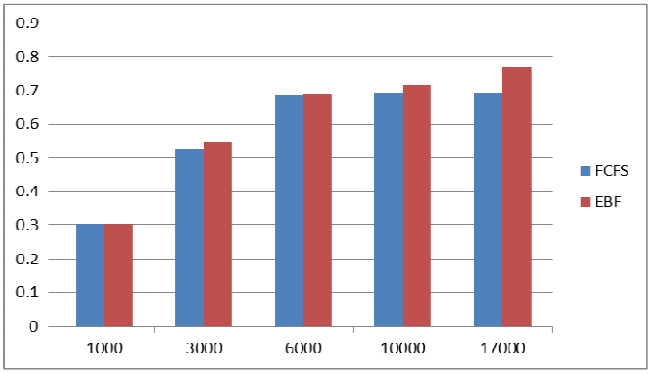

Fig.3 Comparison of Average Utilization in FCFS and EBF in non-linear

Results in fig.3 clearly indicates that in case of non-linear increase of gridlet size easy backfill is better than first come first serve policy for workflow based optimization in grid systems. Average resource utilization is improved in case of backfilling policy.

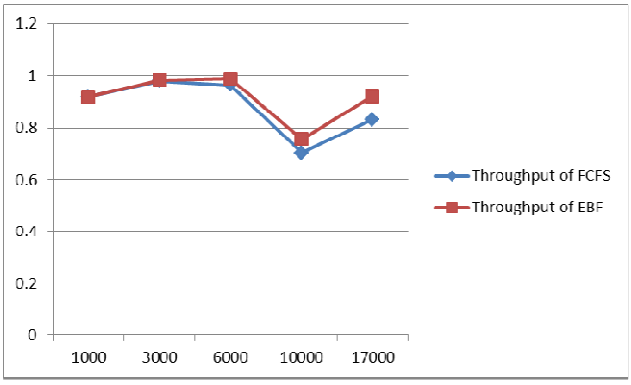

Fig.4 Comparison of throughput in FCFS and EBF based Policy in non-linear Gridlet Size

Results of fig.4 shows that the throughput is maximize in case of EBF in different gridlet size for workflow based optimization in grid system. Easy backfilling has better throughput than FCFS.

Overall size of gridlet increases linearly or non-linearly EBF is better than FCFS in terms of both resource utilization and throughput parameter.

V. CONCLUSION AND FUTURE WORK

Grid computing is an infrastructure for which changes the way of communication, collaboration and computation. First come first serve and easy backfilling algorithm performance evaluated on the basis resource utilization and throughput of linear and non-linear increase in gridlet size. Results in both cases linear and non-linear compare and indicates that EBF is better than FCFS in both resource utilization and throughput parameter. In future work, can add more parameter such load balancing.

REFERENCES

[1] D. B. Skillicorn, "Motivating Computational Grids", 2nd IEEE/ACM International Symposium on Cluster Computing and the Grid, Page No (**401–406**), May **2002**.

[2] F. Xhafa and A. Abraham, "Meta-Heuristics for Grid Scheduling Problems", Metaheuristics for Scheduling in Distributed Computing Environments, Springer-Verlag Berlin Heidelberg, Page No (**1-37**), **2008**.

[3] A. Chakrabarti, "Grid Computing Security", Springer-Verlag Berlin Heidelberg, **2007**.

[4] I. Foster, "The physiology of the grid. Grid computing: making the global infrastructure a reality", Page No (**217–250**), **2003**.

[5] E. Elmroth and J. Tordsson, "Grid resource brokering algorithms enabling advance reservations and resource selection based on performance predictions", Future Generation Computer Systems, Volume-**24**, Issue-**6**, Page No (**585-593**), **2008**.

[6] I. Foster, C. Kesselman and S. Tuecke, "The anatomy of the grid: Enabling scalable virtual organizations", International Journal of High Performance Computing Applications, Volume-**15**, Issue-**3**,Page No (**200-222**), **2001**.

[7] N. Malarvizhi and V. R. Uthariaraj, "A Broker-Based Approach to Resource Discovery and Selection in Grid Environments", International Conference on Computer and Electrical Engineering, **2008**.

[8] B. Schnizler, "Resource Allocation in the Grid: A Market Engineering Approach", Univ.-Verl. Karlsruhe, **2007**.

[9] Ismail and Leila, "Dynamic Resource Allocation Mechanisms for Grid Computing Environment", 3rd International Conference on Testbeds and Research Infrastructure for the Development of Networks and Communities, Page No (**1-5**), **2007**.

[10] K. Srikala, and S. Ramachandram, "Pre-emptive Resource Allocation in Grid Computing (PRAG)", IEEE Confernce on

Information & Communication Technologies, Page No (**240-243**), **2013**.

[11] Krawczyk, Stefan, and K. Bubendorfer, "Grid Resource Allocation: Allocation Mechanisms and Utilisation Patterns", Proceedings of the sixth Australasian workshop on Grid computing and e-research,Volume- **82**, Page No (**73-81**)**, 2008**.

[12] J.C Patni, P. Rastogi, V.K Jayant, M.S. Aswal, "Methods and mechanisms of security in Grid Computing", 2nd IEEE International Conference on Computing for Sustainable Global Development, Page No (**1040-1043**), **2015**.

