



## Resource Discovery and Load Monitoring in Heterogeneous Grid Environment

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### ABSTRACT

The decentralized broker selects computational resources based on actual job requirements, job characteristics, and information provided by the resources. A client is a user who submit a job to the server node. A job refers the task which is to be carried out on computational grid. Then job submitted on scheduler and scheduler will divide a job into smaller tasks and sends that tasks to the available resources. The grid deals with large scale and ever-expanding environment which contains million of users and resources. For this reason, resource selection has been a challenging task. This paper presents a method that achieves efficient Grid resource discovery by forming and maintaining autonomous resource groups and then monitoring load by using Ganglia monitoring system.

**Keywords :** Resource discovery, Job submission, Job execution, Load Monitoring

### 1 Introduction

The task of a Grid resource handler and scheduler is to dynamically identify and characterize the available resources, and to select and allocate the most appropriate resources for a given job. The resources are typically heterogeneous, locally administered, and accessible under different local policies. A decentralized broker, as the one considered here, operates without global control, and its decisions are entirely based on the information made available by individual resources and index servers providing lists of available resources and aggregated resource information.

It includes the all the resource discovery, job submission, execution of job after submission of job and monitoring load on available resources. The initial phase contains setup of grid environment by using the middleware, which was the fundamental task [1]. Next phase is to design, identify resource design, implementation and integrate resources and job Management in heterogeneous framework. Installation of Ganglia for load monitoring.

### 2 Related Work

A lamnitchi and I. Foster defined in their work about the fully decentralized resource discovery in grid environments for the discovery of the resources [2]. Anand Padmanabhan and Shaowen Wang [3] described about the self-organized grouping (SOG) method that achieves efficient Grid resource discovery by forming and maintaining autonomous resource groups. Oliveira, J. F. A & Lechuga, T. A. [4] has defined the pricing of resources on computational grids where in order to determine a price for the resources. usage, first it is necessary to identify the target of consumption, i.e., what is being offered. Following the logic that an outstanding characteristic of the grids is heterogeneity, it is known that a certain job may have different execution times depending on the peer to which it is submitted. The increasing demand for high performance computing resources [5] has led to new forms of collaboration of distributed systems, such as grid computing systems. Moreover, the need for inter operability among different grid systems through the use of common protocols and standards has become increased in the last few years. In this paper I describe and evaluate scheduling techniques for multiple grid scenarios. In particular, they consist of the proposed "best Broker Rank" broker selection policy and two different variants. The task of a Grid resource broker and

scheduler is to dynamically identify and characterize in this paper [6] the available resources, and to select and allocate the most appropriate resources for a given job. The resources are typically heterogeneous, locally administered, and accessible under different local policies. A decentralized broker, as the one considered here, operates without global control, and its decisions are entirely based on the information made available by individual resources and index servers providing lists of available resources and aggregated resource information with resource discovery and monitoring of load on the grid nodes.

### 3 Globus Configuration

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- Globus is a grid middleware, considered to be the de facto standard for grid computing. So, for practical experience of the grid computing it is best to start with the installation of Globus [7].
- Operating System : Fedora 8.0
- Middleware : Globus 4.2.1
- Three main nodes for grid are - (1) user01-nodeB.grid.nirma.com(lp-

10.1..3.13)(server node)  
 (2) user02-nodeA.grid.nirma.com(lp-  
 10.1..3.14)(client node)  
 (3) user03-nodeC.grid.nirma.com(lp-  
 10.1..3.19)(PBS node)

### 4 Resource Discovery

For the job submission on the resource there are many resources are available so for job submission first of all here resources are discovered by webmds which is discovers and characterizes the resources available in the grid environment & it makes advance reservation of resources, and performs the actual job submission. the users request is processed and split into individual job requests [8]. The broker discovers what resources are available by contacting one or more index servers like Webmds. The specific characteristics of the resources found are identified through configuration & configuration of the resource list, by querying each individual resource. Each resource may provide static

information about architecture type, memory configuration, CPU clock frequency, operating system, local scheduling sys- tem,clock rate, etc.This available resources will give the information like machine name,Machine IP,Total condor Load Average,Total Load Average,MIPS of Machine,Kflops Of Machine & operating System. Based on the available resources and requirement of resources for job submission will compared and then job will submitted on reserved resources.As shown in the figure 1,which describes list of all avail- able resources in grid environment.Grid technology provides facility which enable sharing of a large scale, distributed and heterogeneous computing re- sources. Grid resource discovery refers to the process of locating satisfactory resources based on user re- quests.Available resources list can be found from the figure 1.

**5 Job submission and execution in Grid Environment**

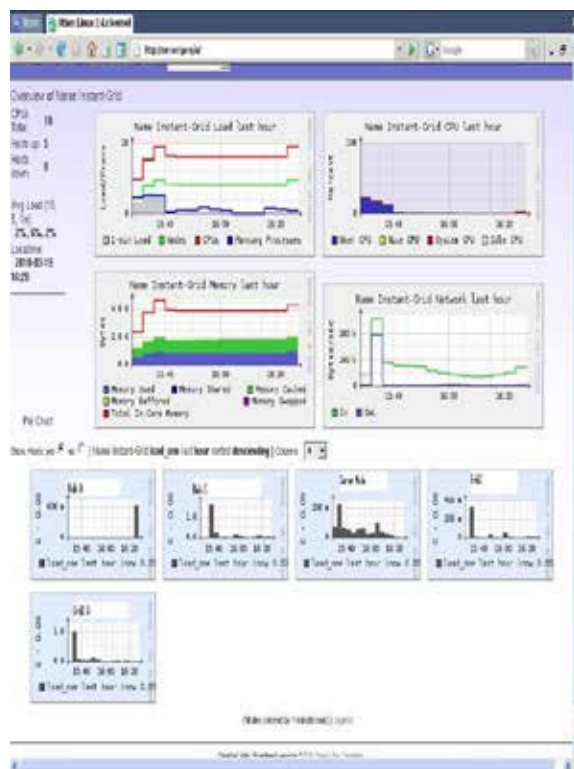
- After the resource discovery of available re- sources run a job on a specified grid computer:- In a basic approach to remote job submission, the user specifies the execution host to be used and submits a job for which either the code already exists on the target machine or else is uploaded as part of the request.
- Computational grid which explores idle process- ing power is formed in the lab.This heteroge- neous grid environment is configured by the in- terconnecting 25 nodes with GT 4.2.1 & condor 7.2.1.
- Head node is loaded with globus & condor,where jobs are submitted by the user.Other nodes are configured with PBS and SGE.
- Job will submitted on head node and then it will run on the grid node which is selected for to run & it will show the result of the job execution.

When webmds run on the localhost it shows the all information of the connected grid resources like address of the resource,GRAM version,host name,total CPUs,etc. This figure shows the other information of the resources like total number of bytes transferred.

**6 Tool for Load Monitoring**

Ganglia is a scalable distributed monitoring system for high performance computing systems such as clusters and Grids. Ganglia uses RRDtool (Round Robin Database) to store and visualize historical monitoring information for grid, cluster, host, and metric trends over different time granularities ranging from minutes to years[8]. It shows the Grid resources's

load ,cpu, network & memory last hour.



**Figure 1: Load Monitoring by Ganglia**

Through job submission on available resources that job will execute on all the available resources and then it through the index server it provides all infor- mation about the resources. Load will distributed on all available resources.For the load monitoring here Ganglia tool is used.Following figure shows the mon- itoring of the load for different resources in grid environment.

**REFERENCES**

[1] Kleinrock, L. MEMO on Grid Computing, Uni- versity of California, Los Angeles, 1969. || [2] A. Iamrtnichi and I. Foster, On fully decentral- ized resource discovery in grid environments, in GRID 01: Proceedings of the Second Interna- tional Workshop on Grid Computing, London, UK: Springer-Verlag, 2001, pp. 5162. || [3] Anand Pad- manabhan., Shaowen Wang, Sukumar Ghosh, and Ransom Briggs, "A Self-Organized Grouping (SOG) Method for Efficient Grid Re- source Discovery " IEEE,2005 |