Research Paper   **Engineering**

Resource Discovery and Load Monitoring in Heterogeneous Grid Environment

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ABSTRACT

The decentralized broker selects computational re- sources based on actual job requirements, job charac- teristics, 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 sched- uler 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 en- vironment which contains million of users and re- sources. For this reason, resource selection has been a challenging task. This paper presents a method that achieves efficient Grid resource discovery by form- ing and maintaining autonomous resource groups and then monitoring load by using Ganglia monitoring system.

Keywords : Resource discovery,Job submis- sion,Job execution,Load Monitoring

1 Introduction

The task of a Grid resource handler and scheduler is to dynamically identify and characterize the avail- able re- sources, and to select and allocate the most ap- propriate resources for a given job. The resources are typically het- erogeneous, locally administered, and ac- cessible under different local policies. A decentralized broker, as the one considered here, operates without global control, and its de- cisions are entirely based on the information made available by individual re- sources and index servers providing lists of available resources and aggregated resource information.

It includes the all the resource discovery, job submis- sion,execution of job after submission of job and mon- itoring load on available resources.The initial phase contains setup of grid environment by using the mid- dleware ,which was the fundamental task[1]. Next phase is to design, iden- tify resource design, imple- ment and integrate resources and job Management in heterogeneous framework.Instal- lation of Ganglia for load monitoring.

2 Related Work

A Iamnitchi 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 re- source 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 re- sources. usage, first it is necessary to identify the target of consump- tion, i.e., what is being offered. Fol- lowing the logic that an outstanding characteristic of the grids is heterogeneity , it is known that a certain job may have different execu- tion times depending on the peer to which it is submitted. The increasing de- mand for high performance computing re- sources[5] has led to new forms of collaboration of distrib- uted 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 tech- niques for multiple grid scenarios. In particular, they consist of the proposed "best Broker Rank" broker se- lection policy and two dif- ferent 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 appro- priate resources for a given job. The re- sources are typically heterogeneous, locally administered, and ac- cessible under different local policies. A decentral- ized broker, as the one considered here, operates without global control, and its decisions are entirely based on the information made available by individual re- sources and index servers providing lists of available resources and ag- gregated resource information with resource discovery and monitoring of load on the grid nodes.

3 Globus Configuration

Globus is a grid middleware, considered to be the de-facto standard for grid computing. So, for prac- tical experience of the grid computing it is best to start with the installation of Globus.

- 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)guser01-nodeB.grid. nirma.com(Ip-

10.1..3.13)(server node)
(2)guser02-nodeA.grid.nirma.com(Ip-
10.1..3.14)(client node)
(3)guser03-nodeC.grid.nirma.com(Ip-
10.1..3.19)(PBS node)

4 Resource Discovery

For the job submission on the resource there are many re- sources 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 environ- ment & it makes ad- vance reservation of resources, and performs the ac- tual job submission. the users request is processed and split into individual job requests[8].The bro- ker discovers what resources are available by contact- ing one or more index servers like Webmds.The spe- cific char- acteristics of the resources found are iden- tified 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.
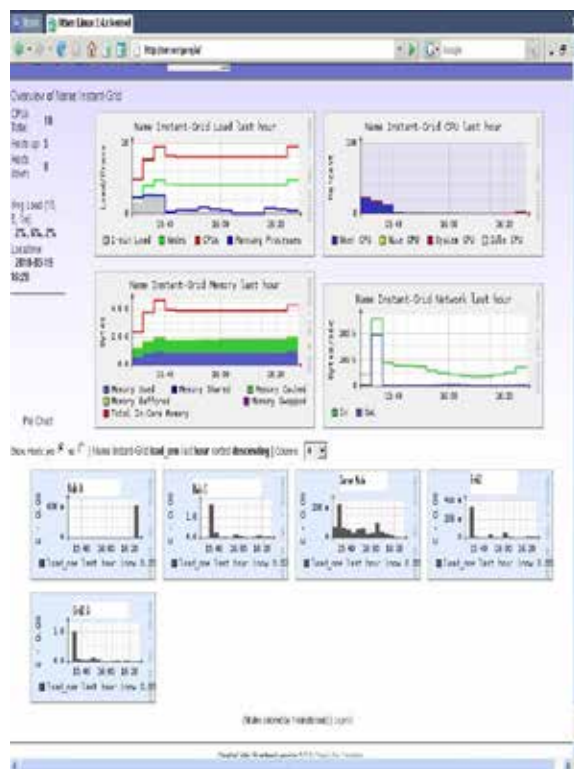
Figure 1: Load Monitoring by Ganglia

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

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