Design and Implementation of Computation Grid, Measure & Improve Performance Parameter:- A Survey

Hardik.M.Patel, Akash Bhatt

Abstract: The goal of this Paper is to develop Reliable Communication System in the Grid. The first initiative is to apply multi-casting features to this protocol & the algorithm for the same is developed. Then apply the algorithm on the Grid by using MPI (Message Passing Interface). Reduce the System call, which is not necessary by the Windows at all the time and which consume more time in background processes. After doing that take the results for the various performance parameters and compare the existing result of various performance parameters.

Keywords: Grid Computing, Network, Computational Grid.

I. INTRODUCTION

Grid computing is an interesting research area that integrates geographically-distributed computing resources into a single powerful system. Many applications can benefit from such integration. Examples are collaborative applications, remote visualization and the remote use of scientific instruments. Grid software supports such applications by addressing issues like resource allocation, fault tolerance, security, and heterogeneity. Parallel computing on geographically distributed resources, often called distributed super-computing, is one important class of grid computing applications.

II. LAYERED ARCHITECTURE OF COMPUTATIONAL GRID

Grid Applications: - This includes the application such as Commercial, scientific, engineering applications. Grid Programming Environments and Tools: - This includes Languages, libraries, compilers, parallelization tools etc. User-Level Middle-Ware & Resources: - This includes the Scheduling services and resource management. Core Grid Middle-Ware: - This includes job management, storage access, accounting etc. Grid Fabric Resources: This includes Networks, software, databases, PCs, workstations, clusters etc [2].

III. COMPUTATIONAL GRID

A Computational Grid consists of a set of resources, such as computers, networks, on-line instruments, data servers or sensors that are tied together by a set of common services which allow the users of the resources to view the collection as a seamless computing/information environment. A grid also allows a single large computation to be spread across several machines, each of which is executing some portion of the computation. This can be done by: Breaking up the tasks into smaller tasks.

IV. UNDERSTANDING

Section Error! Reference source not found. has attempted to define the Grid in a logical sense laying down the minimum conditions that a Grid should be able to achieve. This section gives a brief structural overview of the different Grid implementations. Furthermore, it would elaborate how these different Grid architectures can be configured – either as a Grid for resource sharing or a Grid to be used as an organizational tool. Resource sharing Grids would include Computational Grids, Data Grids and Utility Grids. Grids as organizational tools are Enterprise Grids, Partner Grids and Service Grids.

V. GRID ARCHITECTURE

The focus in this subsection is on distinguishing the different levels of Grid implementations. Scale will be the comparison factor as this subsection explores three different Grid systems, of increasing scale and complexity. The three-tier architecture would include (in order of increasing scale and complexity): Cluster Grid, Intra-Grid and Inter-Grid (also known as the World Wide Grid). Other names that have been coined for this are Cluster Grid, Campus and Enterprise Grid and Global Grid respectively by Wolfgang Gentzsch, Sun Microsystems Director of Grid Computing (Gentzsch, October 2001). The table below details some of the characteristics of the Grid architecture.
Table 1: Characteristics of the 3-Tier Grid Architecture

<table>
<thead>
<tr>
<th>Architectre</th>
<th>End Systems</th>
<th>Owner(s)</th>
<th>Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster Grid</td>
<td>Homogeneous</td>
<td>Single</td>
<td>Centralized</td>
</tr>
<tr>
<td>Intra-Grid</td>
<td>Heterogeneous</td>
<td>Multiple</td>
<td>Distributed</td>
</tr>
<tr>
<td>Inter-Grid</td>
<td>Heterogeneous</td>
<td>Multiple</td>
<td>Distributed</td>
</tr>
</tbody>
</table>

VI. CLUSTER GRID

The simplest Grid form is a connection of computers over a high-speed local area network. This is referred to as a “Cluster Grid”. A cluster would consist mainly of homogeneous end systems that are machines that share the same hardware architecture and the same operating systems. With the homogeneity of the end systems, integration of the machines on the Grid becomes a much easier task. This system would most commonly be found in a single division of an organization where there exists one single administrative control over all the machines. The use of the Grid would not necessarily require special policies or security concerns since there is centralized control monitoring all the processes. Given that the use of the Cluster Grid is primarily contained within the division, only one Grid site is needs to be maintained. Although some people would refer to this as simply a “cluster” (due to the centralized control), the author has the Chosen to classify this as the simplest Grid form and renamed it as the Cluster Grid [2].

![Fig 3: Cluster Grid](image)

Local Clusters Deployed On a Departmental/Divisional Basis

VII. INTRA-GRID

The next level of Grid system is named as such because it refers to the fact that this Grid comprises machines that span the intranet connection of an organization. This is also sometimes referred to as the “Campus Grid” or “Enterprise Grid” since the bounds of the Grid are kept within a college campus or an enterprise. Relative to Cluster Grids, Intra-Grids introduce more complexity as it increases in scale of implementation. Since the end systems in an Intra-Grid are owned by multiple divisions, it is likely that the types of resources would be more diverse and consist of heterogeneous systems. With different divisional ownership of end systems, separate administration of individual systems would be likely to emerge, contributing to the heterogeneity. Under separate administration, the emergence of different Grid sites is highly possible (i.e. divisions form their own Cluster Grids within the Intra-Grids). The presence of physical and administrative heterogeneity and the increased number of end systems would lead to difficulty in creating an accurate and updated global knowledge of resources available on the Grid. All these add up to form the various complexities that characterize the implementation of an Intra-Grid. Even with the autonomy given to the respective divisions, it is reasonable to assume that the exertion of a minimal level of centralized administrative control from the parent organization in order to assume the role of a watchdog. On the other extreme, the parent organization can force decisions using a top-down approach, to enforce the uniformity in Grid management across division or collapse the management into a centralized administration that exists in Cluster Grids, reducing Grid complexity. This is not necessary in Cluster Grids, where the Grid complexity is lower. Due to the different functions that Intra-Grids play relative to Cluster Grids, other services that are not usually needed in Cluster Grids may have to be implemented such as resource sharing and resource brokerage services.

![Fig 4: Intra-Grid Merging Cluster Grids into an Intra-Grid That Is Often Within a College Campus or an Enterprise](image)

VIII. INTER-GRID

This is the most complex Grid system that is being considered because it spans not one but multiple organizations and is possibly implemented on a global scale, connecting inter-networked systems regardless of boundaries. Like Intra-Grids, the end systems on an Inter-Grid are heterogeneous and numerous. In addition to the complexity of Intra-Grids (heterogeneity, separate administrations and lack of global knowledge), Inter-Grids introduce more complicating factors.
IX. CONCLUSION

The author predicts that there will be five major players in the new utility computing ecosystem. They are the Grid resource supplier, the Grid infrastructure supplier, the utility service provider, the re-seller and the end user. Further industry analysis reveals that there are new roles for current players in the traditional IT provision industry and opportunities for new entrants in this new ecosystem. The author hopes that this paper has shed some light on the characteristics of each role to help industry players better understand the requirements of the new roles and enable them to see how and where they would fit in this new ecosystem. Current players in the IT provision industry would have to decide which of the above roles to play in this new utility computing ecosystem and to re-define their market strategies accordingly. This thesis also suggests that players in the telecommunications sector, who want a share of this growing pie, can enter as new entrants to the field by leveraging on their strengths.

REFERENCES


AUTHOR'S PROFILES

Hardik M. Patel was born in Gujarat, India in October, 1989. He received his bachelors of Engineering in Computer Engineering from Ganpat University, Kherva, Mehsana (India) in august 2010. And is currently pursuing his Master of Engineering in Computer Engineering from Gujarat Technological University (India). His research interests include Grid Computing, Cloud Computing and Wireless Sensor Networks.

Akash Bhatt was born in Gujarat, India in December, 1988. He received his bachelors of Engineering in Computer Engineering from Saurashtra University, India in June 2010. And is currently pursuing his Master of Engineering in Computer Engineering (Wireless Mobile Computing) from Gujarat Technological University (India). His research interests include Wireless Grid Computing, Mobile Adhoc Network and Wireless Security.