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Efficient Methodology and Applications of Dynamic Heterogeneous Grid Computing

Mr. R.Karthikeyan MCA., M. Phil. [1], Dr. T. Geetha.,M.C.A.,M.Phil.,Ph.D [2,]

Ms.R.Deepika [3], Ms.R.Reshma [4]

Assistant Professor, Department. of MCA, Gnanamani College of Technology, Namakkal, India[1]

Head of the Department, Department of MCA, Gnanamani College of Technology, Namakkal, India[2]

PG Scholar, Department of MCA, Gnanamani College of Technology, Namakkal, India[3]

PG Scholar, Department of MCA, Gnanamani College of Technology, Namakkal, India[4]

ABSTRACT: Grid computing systems work on the principle of pooled resources. Let's say you and a couple of friends decide to go on a camping trip. You own a large tent, so you've volunteered to share it with the others. One of your friends offers to bring food and another says he'll drive the whole group up in his SUV. Once on the trip, the three of you share your knowledge and skills to make the trip fun and comfortable. If you had made the trip on your own, you would need more time to assemble the resources you'd need and you probably would have had to work a lot harder on the trip itself. The purpose of this seminar to give the basic overview of Grid computing, in such way that reader will able to understand basic concept of grid computing, principal operation and some of the issues of Grid computing. Grid computing enables the use and pooling of computer and data resources to solve complex mathematical problems. The technique is the latest development in an evolution that earlier brought forth such advances as distributed computing, the Worldwide Web, and collaborative computing.

KEYWORDS: distributed, computed, network, task, memory.

I. INTRODUCTION

Grid computing can mean different things to different individuals. The grand vision is often presented as an analogy to power grids where users (or electrical appliances) get access to electricity through wall sockets with no care or consideration for where or how the electricity is actually generated. In this view of grid computing, computing becomes pervasive and individual users (or client applications) gain access to computing resources (processors, storage, data, applications, and so on) as needed with little or no knowledge of where those resources are located or what the underlying technologies, hardware, operating system, and so on are. Though this vision of grid computing can capture one's imagination and may indeed someday become a reality, there are many technical, business, political, and social issues that need to be addressed. If we consider this vision as an ultimate goal, there are many smaller steps that need to be taken to achieve it. These smaller steps each have benefits of their own. Therefore, grid computing can be seen as a journey along a path of integrating various technologies and solutions that move us closer to the final goal. Its key values are in the underlying distributed computing infrastructure technologies that are evolving in support of cross-organizational application and resource sharing—in a word, virtualization—virtualization across technologies, platforms, and organizations. This kind of virtualization is only achievable through the use of open standards.

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II. ARCHITECTURE OF GRID COMPUTING

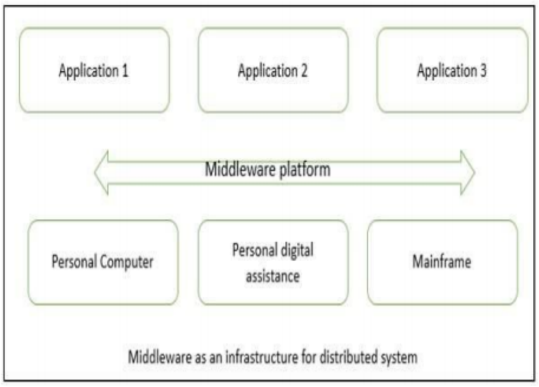

Figure 1: Architecture

There is not such a unique or standard consensus on the Internet of Things (IoT) architecture which is universally defined. The IoT architecture differs from their functional area and their solutions. However, the IoT architecture technology mainly consists of four major components:

Other more subtle benefits can occur using a grid for load balancing. When jobs communicate with each other, the Internet, or with storage resources, an advanced scheduler could schedule them to minimize communications traffic or minimize the distance of the communications. This can potentially reduce communication and other forms of contention in the grid. Finally, a grid provides excellent infrastructure for brokering resources. Individual resources can be profiled to determine their availability and their capacity, and this can be factored into scheduling on the grid. Depending on the accounting facilities in place, different organizations participating in the grid can build up grid credits and use them at times when they need additional resources. This can form the basis for grid accounting and the ability to more fairly distribute work (and cost) on the grid.

III. LITERATURE REVIEW

With the proliferation of high performance workstations and the current trends towards high-speed computer networks, network based distributed computing has attracted a lot of interest. The availability of powerful microprocessors and high-speed networks as commodity components has enabled high performance computing on distributed systems (wide-area cluster computing). In this environment, as the resources are usually distributed geographically at various levels (department, enterprise, or worldwide) there is a great challenge in integrating, coordinating and presenting them as a single resource to the user; thus forming a computational Grid (Buyya et al 2000). The aggregate computing power of a group of general-purpose workstations is comparable to that of supercomputers. Furthermore, it has been shown that the average utilization of a cluster of workstations is only around10% consequently, around 90% of their computing capacity is sitting idle. This un-utilized or wasted fraction of the computing power is sizable and if harnessed can provide a cost-effective alternative to expensive supercomputing platforms (Manish Parashar et al 1992) During the heyday of the super computer, access to hardware capable of performing parallel processing was limited and often expensive.

IV. TYPES OF GRID

Grid is a type of parallel and distributed system that enables the sharing, selection, and aggregation of geographically distributed "autonomous" resources dynamically at runtime depending on their availability, capability, performance, cost, and users' quality-of-service requirements.
Grid computing can be used in a variety of ways to address various kinds of application requirements. Often, grids are

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categorized by the type of solutions that they best address. The three primary types of grids are summarized below. Of course, there are no hard boundaries between these grid types and often grids may be a combination of two or more of these. However, as you consider developing applications that may run in a grid environment, remember that the type of grid environment that you will be using will affect many of your decisions.

4.1.Computational grid:

A computational grid is focused on setting aside resources specifically for computing power. In this type of grid, most of the machines are high-performance servers.

4.2. Scavenging grid:

A scavenging grid is most commonly used with large numbers of desktop machines. Machines are scavenged for available CPU cycles and other resources. Owners of the desktop machines are usually given control over when their resources are available to participate in the grid.

4.3. Data grid:

A data grid is responsible for housing and providing access to data across multiple organizations. Users are not concerned with where this data is located as long as they have access to the data. A data grid would allow them to share their data, manage the data, and manage security issues such as who has access to what data.

V. APPLICATIONS OF GRID COMPUTING

Grid Computing has many application fields. It is being used more and more systematically, and for many reasons. The first is the improvement of performance and the reduction of costs due to the combining of resources. The possibility of creating virtual organizations to establish collaboration between teams with scarce and costly data and resources is another.

Scientists, who use applications that require enormous resources in terms of computing or data processing, are large consumers of computational grids. One finds for instance many grids in particle-physics experiments. Nor are leading industries staying behind: grids are massively present in the automobile and aeronautical business, where digital simulation plays an important part. In practice, grids are very useful in crash simulations, as well as for computer-aided design.

More recently, grids have emerged in other areas with the purpose of optimising company business. The aim is to combine material resources for several services by reallocating them in a dynamic way depending on performance peaks. This strategy offers considerable cost cutting thanks to better management of resources, administrative tasks and maintenance. This last application field is of particular interest to France Telecom, as we shall see.

VI. GRID SECURITY

Grid security Security requirements are fundamental to the grid design. The basic security components are comprised of mechanisms for authentication, authorization, and confidentiality of communication between grid computers. Without this functionality, the integrity and confidentiality of the data processed within the grid would be at risk. To properly secure your grid environment, there are many different tools and technologies available. This chapter examines some of those technologies. In order to better understand grid security, it is best to start with some basic grid security requirements and security fundamentals. Grid security builds on well-known security standards. We discuss general security requirements followed by security fundamentals. In this chapter, we discuss the nuts and bolts of grid security and the underlying technologies that allow for grid security to work.

VII. CONCLUSION

With the rapid development of various emerging distributed computing technologies such as Web services, Grid computing, and Cloud computing, computer networks become the integrant of the next generation distributed

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computing systems. Therefore, integration of networking and distributed computing systems becomes an important research problem for building the next-generation highperformance distributed information infrastructure.

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BIOGRAPHY

1. R.KARTHIKEYAN
Assistant Professor,
Department of MCA
Gnanamani College of Technology
Namakkal (Dt),
2 Dr. T. GEETHA,
Head of the Department,
Department of MCA
Gnanamani College of Technology
Namakkal (Dt),
3. Ms.R.DEEPIKA
PG Scholar
Department of MCA
Gnanamani College of Technology
Namakkal (DT),
4. Ms.R.RESHMA
PG Scholar
Department of MCA
Gnanamani College of Technology
Namakkal (DT),