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A TOOL FOR ENHANCING THE COMPUTING POWER

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ABSTRACT:

Solutions that require the least amount of investment must be discovered in light of the enormous increase in the demand for computing capacity. Grid technology is moving in this direction, leaving the academic incubator and entering the business world. Storage devices, data sources, and supercomputers, all of which are geographically dispersed, are connected here and utilized by users worldwide as a single, unified resource. This helps make use of the resources' idle time, which would otherwise be wasted. This article provides a brief overview of grid computing and its advantages. This technology is being used in more and more ways, and this article also looks at some of these uses.

KEYWORDS : *Distributed Computing, Grid Computing, Benefits of grid Computing, Application of Grid Computing.*

INTRODUCTION:

The way that society manages information and information services has changed as a result of the proliferation of high-speed broadband networks, the ongoing increase in computing power, and the expansion of the Internet. Storage devices, data sources, and supercomputers are examples of geographically dispersed resources that are interconnected and can be utilized by users worldwide as a single, unified resource. As a result, distributed computing, in which various physical and virtual resources can be shared, has emerged. Virtual resources include operating systems, software, applications, and services that can be exchanged and are independent of its physical location, whereas the physical resources include computational power, storage devices, and communication capacity. One sort of disseminated figuring is Lattice Registering.

Grid Computing

As a distributed computing architecture, grid computing has recently gained popularity. Grids are extremely large, virtualized, distributed computing systems that enable users to access the computing resources of numerous machines spread out across the globe. The ideal scenario for which grid computing strives is for the CPU cycles and storage of millions of systems across a global network to function as a flexible, easily accessible pool that can be utilized by anyone who requires it, similar to the way power companies and their customers share the electricity grid. This is how grid computing got its name. They enable virtual organizations and cover multiple administrative domains. These organizations can pool their resources to build an even bigger grid.

Grid computing has matured through the Search for Extraterrestrial Intelligent (SETI) and the Search for ways to make use of unused enterprise computing power. It vows to tackle the extra clock pattern of every one of your PCs and utilize this recently discovered ability to accelerate the most complicated of your computational or information handling requests (Asagba, et al. 2008). It also grants access to all PC and networked systems working on any processor-intensive task's storage and data (Davey, 2003; Foster et al., 1999).

Grid Computing

Evolution of Grid Computing

At the beginning of the 1990s, the concept of making computer power as accessible as an electric power grid inspired the term "Grid Computing." Distributed.net and SETI@home popularized CPU scavenging and volunteer in 1997 and 1991, respectively, to utilize the power of worldwide networked personal computers to solve CPU-intensive research issues (Berman et al., 2003). Ian Foster, Carl Kesselman, and Steve Tuecke came up with the idea of grid computing, and one of their seminal presentations, "The Grid: Plan for a brand-new computing infrastructure." The Globus Toolkit, which includes services for computation management, storage management, security management, monitoring, and other related areas, was the result of their efforts. They are generally acclaimed as the "father of the matrix" (Asagba, et al. 2008).

According to Akinyemi et al. (2007), a grid system is a virtual organization made up of several distinct autonomous domains. The term "virtual organization" (VO) is frequently used in the Grid community. According to Meliksetian et al. (2004), a virtual organization is a corporate, educational, not-for-profit, or other productive entity that does not have a central location and only exists through telecommunications tools. Members of multiple VOs on the Grid have access to a variety of computational, instrument-based data, and other resources. According to Joseph et al. (2004), VO makes its resource significantly more useful and accessible to its users.

Benefits of Grid Computing

There are numerous advantages to grid computing, some of which are (Asagba et al. 2008):

1. Under-utilization of Resources: Taking advantage of underutilized resources by running an existing application on multiple machines, taking advantage of idle time on other machines, and aggregating disk drive capacity that is not being used.
2. Reduces Processing Time: Complex numerical and data analysis problems take less time to solve.
3. Provide Access to Information: By providing unified data access during the querying procedure for non-standard data formats, information accessibility maximizes the utilization of existing data assets (Farago-Walker, 2001).
4. optimizes the existing IT infrastructure to reduce costs: The grid speeds up design processes and reduces costs by optimizing the utilization of existing IT infrastructure investments, allowing partners to share data and distribute workflow, and as a result, Foster and others, 2005B).
5. Making it possible to access parallel CPU capacity: Large-scale parallel computation on the grid could be used to improve performance in computationally intensive applications.
6. 6.improves dependability: Grid technology offers a different strategy for increasing reliability. By running multiple copies of important jobs concurrently on separate grid machines, parallelization

can improve reliability. Any kind of inconsistency, including failures, data corruption, and tempering, can be looked for in their results.

7. Balance of resources provided: Job prioritization and scheduling, as well as effective resource balancing measures for occasional peak loads, are all provided by the grid.
8. Viable administration of assets: Organizational management can effectively control expenditures for computing resources across a larger organization by utilizing grid technology, which makes it simple to visualize resource capacity and utilization.
9. Interoperability of virtual associations: By allowing the sharing and collaboration of the diverse resources that are available, the grid provides facilities for collaboration as well as interoperability between various virtual organizations.
10. Having access to more resources: Other specialized devices, such as embedded systems and cameras, can be accessed through the grid.
11. Bringing together disparate systems: Lattice figuring can be utilized to outfit heterogeneous frameworks together into a uber PC by applying more noteworthy computational capacity to an undertaking.
12. Virtualizing the grid: Framework figuring offers network virtualization, subsequently making a solitary, nearby PC to embrace strong applications.

Financial Services

The most competitive areas that financial communities constantly strive to achieve are customer satisfaction and risk reduction with the emergence of a competitive market force. Among the most important goals for financial communities are those related to sophistication, accuracy, and speed of execution. Real-time access to both current and historical market data, intricate financial modeling based on the respective data, and quicker responses to user queries all contribute to the achievement of these goals.

In this industry, advanced systems that provide all of the competitive solutions are provided by grid computing (Jia, 2006). By utilizing the grid job scheduling and data access features, these solutions are dependent on providing increased access to massive amounts of data, real-time modeling, and faster execution. The Open Grid Service Environment (Hochreiter, 2005), which provides an abstract service stack for modeling large-scale computational financial problems as abstract workflows, was one of the grid solutions presented. Data mining applications have been developed using grid computing to provide efficient online financial services to corporate and retail customers. According to Fan (2000), this is useful for partners and financial institutions' intelligent risk management and decision-making.

Manufacturing

The majority of engineering and design projects can be completed in much less time due to the intense competition in today's business and industry sectors. They need components to catch information, accelerate the examination on the information, also, give quicker reactions to advertise needs. The analysis of real-time data to find a particular pattern in a problem, parametric studies to verify various aspects of the systems, modeling experiments to create new designs, and simulation activities to verify the accuracy of existing models are all examples of these inherently complex engineering activities and design solutions. Grid computing systems offer a wide range of capabilities for these kinds of modeling and analysis tasks.

To meet computing power requirements, these advanced solutions also provide resource managers and job schedulers with complex functions.

On account of designing work, virtual cooperation on the plan, creation and upkeep of items that are depicted in complex organized item model data sets is a significant test (Turk et al., 2004, Dolenc et al., IntelGrid and 2004). Web service paradigms as they currently exist may not fully support such collaboration (Maad et al., 2005). The VO concept, which provides a robust framework for engineering collaboration due to its adaptability, security, and flexibility, is the potential grid solution.

Life Science & Health Care

The pharmaceutical treatment and drug discovery processes are currently undergoing rapid transformations as a result of significant advancements in the life sciences industry. The information technology industry now faces a number of technical difficulties as a result of these advancements. These difficulties incorporate immense measures of information investigation, information development, information storing, and information mining. Data security, secure data access, secure storage, privacy, and highly flexible integration are additional requirements that must be met in addition to the complexity of data processing. While processing the data, the Grid Computing systems can simultaneously provide secure data access mechanisms and a common infrastructure for data access. Today, life sciences make use of Grid Computing systems to run sequence comparison algorithms and make it possible to model molecules with the secured data mentioned above.

With this, the Life Sciences industry can now afford world-class information analysis related to this discussion, with faster response times and significantly more accurate results. Many of these advances in grid computing in this field are based on the analytics and system efforts that surround genomic, proteomics, and molecular biology efforts., and in particular the fields of Grid Computing. to a grid that could handle administrative databases, medical image archives, and specialized equipment like MRI machines, CAT scanners, and cardio angiography devices. This could make it easier to make diagnoses, make it faster to analyze complicated medical images, and make life-saving applications like telerobotic surgery and remote cardiac monitoring possible. Additionally, the production of interactive medical simulations like heart simulations and the analysis and management of medical images are two areas where grid computing has proven useful. Grids have also been used to support virtual collaboration in e-Hospitals, which are a virtual network of hospitals that provide services like e-surgery, medical analysis, and medical training.

Telecom & Media

The production, broadcasting, delivery, and playout of interactive media content (audio, video, and image) in real time presents the greatest obstacle for media applications. The Grid Visualization Kernel (GVK) [22] is one such grid solution. It handles communication between the simulation that generates the data and the visualization of the simulated data and allows the visualization pipeline (data enrichment/reduction, followed by mapping the data to an abstract form, and finally composing the visual image) to be ported to grid resources. and G-Vid [24], which is based on GVK and enables the grid-based production of interactive, real-time MPEG4 video content.

Emerging technologies are being used to support online games in collaborative Grid Computing disciplines that make use of on-demand provisioning of computationally intensive resources like computers and storage networks. Instead of centralized servers and other fixed resources, these resources are selected based on the requirements, which frequently include factors like the volume of traffic and the number of players. These games that are driven by demand offer a flexible strategy at a lower initial cost in terms of hardware and software resources. We can imagine that these games use more computing resources when there are more players playing at the same time and less when there are fewer players playing at the same time. Grid Computing gaming environments can accommodate such virtualized environments, making it possible to play games together (Maad et al., 2005).

Government & Education

The goal of government grid computing environments is to coordinate access to massive amounts of data held by various government agencies. This speeds up the resolution of critical issues, such as those arising in emergency situations, and other routine activities. The decision-making process in these key environments is quicker and more effective. Grid Computing makes it possible to set up virtual organizations with a lot of people from different government agencies (like local, state, and central). Due to the high levels of security in government and the extremely complex requirements (Maad et al.,), the creation of virtual organizations and the associated elements of security pose the greatest challenges. 2005).

The development of an egovernment infrastructure that supports the shift to a service-oriented e-government model is the primary obstacle in e-government, which is another application area (Maad et al.,). 2005b).

The education sector differs significantly between the first and developing worlds. Digital learning resources and computing power are the root causes of this distinction. Sadly, each and every one of these resources can be found all over the world. There is no denying that information and communication technology (ICT) is significantly contributing to the global spread of e-learning. But if we really want to get past these differences, we need a revolutionary strategy that makes it possible to use computing and learning resources that are spread out across different locations together as a consolidated environment. This will lead to new ways of being flexible, interoperable, and extensible. Fortunately, Grid technologies are capable of integrating all of these knowledge resources and producing supercomputing power from computers located in different locations to access these resources without compromising local autonomy (GF/117). For instance, the Indian Institute of Information Technology and Management in Kerala is in charge of the Kerala Educational Grid Grid project (Sherly, 2005). This project envisions connecting colleges and universities to resource centers that will connect them to education materials on demand and increase collaboration and networking among affiliated academics.

Environment applications entail the simultaneous execution of hundreds of programs that correspond to climate models, large-scale air pollution, the storage of nuclear waste, and pollution. There have been a number of grid solutions offered. A national VO comprised of researchers and resources from seven UK institutions was established (Thandavan, 2004) for a specific large-scale air pollution model. Within the CrossGrid consortium (CrossGrid), 21 EU institutions formed a comparable VO on a global scale.

Weather forecasting is another field that requires a lot of data generation and processing. Both nearby climate information stations and satellites gather and send enormous volumes of information for investigation. In order to facilitate prompt evacuations of coastal areas, networks of detectors have been installed in the ocean in numerous locations to detect tsunamis and predict their size and course. For weather and other natural disaster forecasting, grid computing has been extensively utilized.

Research Collaboration

The analysis of enormous amounts of data is necessary for research-oriented organizations and universities collaborating on advanced research. Experiments in subatomic particle and high energy physics, remote sensing sources for earth simulation and modeling, and analysis of the human genome sequence are all examples of these kinds of projects. These organizations that collaborate on research produce petabytes of data, necessitate huge amounts of storage space, and require thousands of computing processors.

Data, computational processors, and hardware instruments like telescopes and advanced testing equipment must all be shared by researchers in these fields. The majority of these resources are spread out over a large area and pertain to data-intensive processing. By forming one or more virtual organizations with specific sharing capabilities, the Grid Computing discipline provides mechanisms for resource sharing in these circumstances. With a wide range of participants from all over the world, these virtual organizations are established to address specific research issues.

In the field of physics, for instance, the LHC (LHC) is anticipated to begin producing a tsunami of raw data; its annual output of 15 petabytes, or 15 million gigabytes, will soon surpass that of any other scientific experiment that has ever been conducted. Researchers at CERN, the European Association for Atomic Exploration, coordinated the LHC

Figuring Matrix, an organization of 100,000 PCs in 33 nations, to adapt to this extraordinary pile of information that will be created by the LHC. Similarly, molecular design and engineering is proving to be a significant obstacle in the field of chemistry (Schuller et al., 2005). The infrastructure for molecular design and engineering that is provided by grid solutions like OpenMolGRID (OpenMolGRID) is proving to be useful.

CONCLUSION

Network Registering has arisen as a useful asset for upgrading the PC power. This technology, which is also known as "poor man's supercomputer," makes use of the idle capacities of a variety of resources that are spread out over a large area.

Calculations and other tasks that would otherwise take a long time can be completed using these idle capacities. Here, Grid Computing has been briefly discussed. A number of applications and the advantages of grid computing have also been discussed.

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