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REVIEW ARTICLE

Grid Computing- A Review

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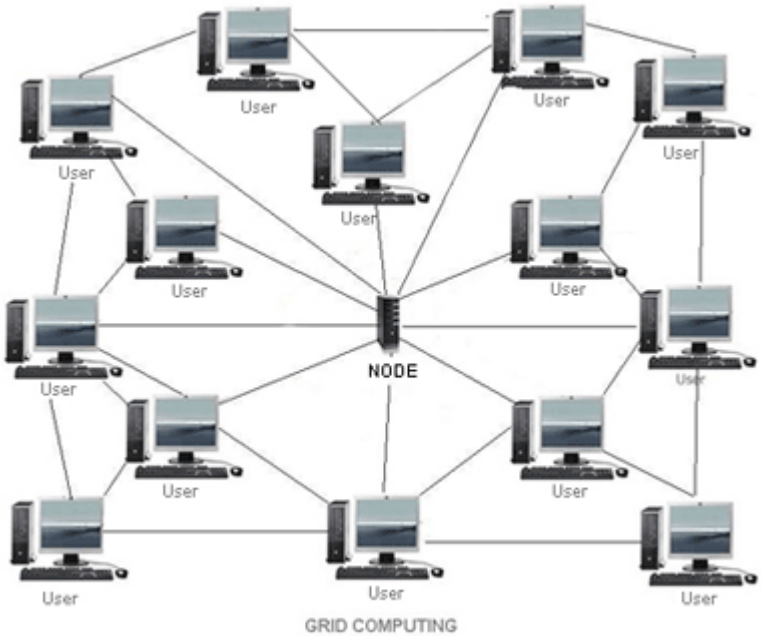
Abstract— Grid computing is a promising technology for number crunching available today. It is upgraded form of distributed computing. Grid computing acts as a backbone for implementing Cloud computing. Grid computing is considered as most related predecessor technology of cloud computing. This technology provides enormous processing power, memory and storage capacity to every simple computer on the Grid. It is able perform large scale data processing, which is difficult to do even for many supercomputers. It also works as a backbone technology for cloud computing.

Keywords— Grid computing, Infrastructure, Resources, Platform, Processing

I. INTRODUCTION



Grid computing [1] is the collection of computer resources from multiple locations to reach a common goal. The grid can be thought of as a distributed system with non-interactive workloads that involve a large number of files. It is different from traditional high performance computing systems such as cluster computing in that grid computers have each node set to perform a different application. Processing devices tend to be more heterogeneous and geographically dispersed than cluster computers. The grid computing [4] concept isn't a new one. It's a special kind of distributed computing. In the grid computing system, every resource is shared, turning a computer network into a powerful supercomputer. With the right user interface, accessing a grid computing system would look no different than accessing a local machine's resources. Every authorized computer would have access to enormous processing power and storage capacity. Grid computing systems work on the principle of pooled resources (eg. CPU, Memory, Storage). Grid computing system uses the concept of sharing the load across multiple computers to complete tasks more efficiently and quickly. Grid is a form of networking that focus on communication among devices, grid computing harnesses unused processing cycles of all computers in a network for solving problems too intensive for any stand-alone machine [6]. The idea of grid computing was first established in the early 1990s by Carl Kesselman, Ian Foster and Steve Tuecke. They developed the Globus Toolkit standard, which included grids for data storage management, data processing and intensive computation management [7].

Although a single grid can be dedicated to a particular application, commonly a grid is used for a variety of purposes. Grids are often constructed with general-purpose grid middleware software libraries. Grid sizes can be quite large [3].

Grid computing is the collection of computer resources from multiple locations to reach a common goal. The grid can be imagined as a distributed system with non-interactive workloads that involve a large number of files. This paper introduces this technology in the first section and then explains in detail the working and applications of Grid computing.

II. GRID COMPUTING

Grid computing can be defined as sharing information and power, which gives us access to another type of heterogeneous resources which are geographically separated [2]. The grid is based on IPs (Internet protocols) and on the principle of parallel and distributed computing. The grid computing provides the sharing of computational resources, storage devices, applications, equipment etc. in an efficient way. Several companies and organizations are working together to create a standardized set of rules called protocols to make it easier to set up grid computing environments [4]. It's possible to create a grid computing system right now and several already exist. In general, a grid computing system requires:

- At least one computer, usually a server, which handles all the administrative duties for the system.
- A network of computers running special grid computing network software.
- A collection of computer software called middleware.

The potential for grid computing applications is limitless, provided that everyone agrees on standardized protocols and tools. Without a standard format, third-party developers, independent programmers who want to create applications on the grid computing platform are unable to create applications that work on different systems. A standardized set of protocols means that developers could concentrate on one format while creating applications.

Grids have a variety of resources based on diverse software and hardware structures, computer languages, and frameworks, either in a network or by using open standards with specific guidelines to achieve a common goal.

Grid operations are generally classified into two categories [7]:

- **Data Grid:** A system that handles large distributed data sets used for data management and controlled user sharing. It creates virtual environments that support dispersed and organized research. The Southern California Earthquake Center is an example of a data grid; it uses a middle software system that creates a digital library, a dispersed file system and continuing archive.
- **CPU Scavenging Grids:** A cycle-scavenging system that moves projects from one PC to another as needed. A familiar CPU scavenging grid is the search for extraterrestrial intelligence computation, which includes more than three million computers.

III. GRID COMPUTING APPLICATIONS

There are several grid computing systems which have been used for different applications. Some important systems are as listed below.

SETI@home

The abbreviation SETI stands for Search for Extraterrestrial Intelligence (SETI) project. It is one of the earliest grid computing systems put to work. The mission of the SETI project is to analyze data gathered by telescopes in search of evidence for alien communications. It generates a lot of information which cannot be analyzed effectively by a single computer. Along with MilkyWay@home and Einstein@home, it is the third major computing project of this type that has the investigation of phenomena in interstellar space as its primary purpose [1].

Folding@home

This project is administered by the Pande Group which is a nonprofit institution in Stanford University's chemistry department. The Pande Group is doing research on proteins. The research includes the way proteins take certain shapes, called folds, and how protein misfoliding may cause diseases like Parkinson's or Alzheimer's.

Rosetta@home

It is a project for protein structure prediction on the Berkeley Open Infrastructure for Network Computing (BOINC) platform, run by the Baker laboratory at the University of Washington.

IV. CONCLUSION

This paper did a thorough study of Grid computing and tried to explain its working and usefulness in the conditions where extreme processing power, memory and storage are required to do research in some particular area. I think the detailed description of Grid computing help the readers to understand the concept very easily and clearly. Grid computing appears to be the promising model for future computing so there is great scope of future research in this area.

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