

Grid Computing Used For Next Generation High Speed Processing Technology

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Abstract – In grid computing, the total work load is distributed among many computers which are linked together through some kind of local or global network topology. There is no restriction of work it could be of any type like mathematical calculations or processor performing different tasks. Also grid computing do not bounds the computers linked together and they could be used also as in normal conditions they are being used A supercomputer could be created by linking different computers through grid computing. This research paper presents a comprehensive survey to grid computing technology and clarifies its different aspects in the domain of high speed huge data volume based computing. The research paper also investigates emerging trends in the modern grid computing technology. Grid computing is one the stat of the art technologies being used for high speed computing.

I. INTRODUCTION TO GRID COMPUTING

Nearly all the technologies being used today is changing swiftly as the use of Internet is increasing all over the world the networks also behave similarly as the tools used are losing their cost day-by-day. To come about and to have great command on those changes surely new technologies having greater flexibility are required. But for the gain of those new technologies there is a lot of work to do because there are some features like cost, reusability, speed and quality that have great impact on them. So the ideas like super computer, which is made by connecting several computers through a computer bus having fast speed, are gaining fame in which several machines work together by linking through a network for a common task. This mechanism is known as Grid computing and is expected to play an important role in the field of computing in future.

A. Grid Computing Networks

Grid computing instead of relying on high performance focuses on sharing networks. The complexity of grid computing is more then normal distributed computing. Normal distributed computing has an environment in which machines are distributed and managed individually and separately. Those machines rely on their own resources like own processing and memory. While the grid computing tries to make use of its linked machines work for same task. Grid computing creates a pond of computing resources.

B. Origin Of Grid Computing

One can't say about the start of basics of grid computing. There are different thoughts about the beginning of grid computing. It could be more right to say that the keyword Grid computing came into being by the start of 1990 decade due to the work of two people Carl Kesselmen's and Ian Foster's. They gave the main theme of grid computing. The Grid computing gained real fame in 2007. Electricity is an example of a kind of tool for which grid computing was been developed.

The software can be used to connect various databases into networking which is the present form of grid computing. Well one could say that some years ago the effort was made to establish a process that would allow the computers to share in the situation. That made the grid computing to come into world. In 1990's European countries and USA gave aid for the development of grid computing.

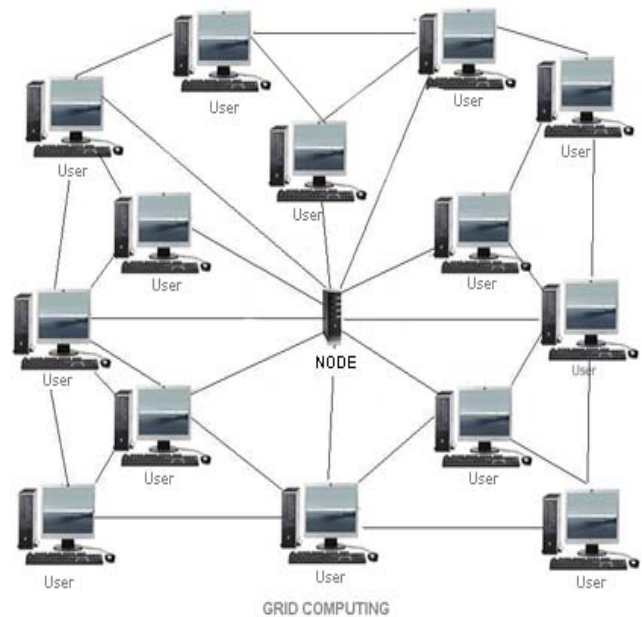


Fig. 1: Reference: www.gridcomputing.org

C. Grid Computing Infrastructure

Grid computing has nearly the same structure as of a supercomputer. The network of grid computing can be composed of devices having different in sense of capabilities like speed. Grid computing is the combination of computer resources from multiple administrative domains for a common goal.[1] www.wikipedia.com

Many problems of science and engineering can be solved through grid computing as lot of data can be transferred through it and also it provides a good networking security. Grid computing can provide a solo accessing position to whole of network.

But the grid computing is expensive and it also has a limit to its resources due to having a specific structure in its network. Grid computing is best suitable for small networks having a very few resources.

D. Configuration Settings

Nearly all usage of grid computing is dependent on its configuration. It can be used for small advertisement and it also supports the type of database management systems that is the reason oracle has its own grid computing. The grid standards today are in a stage of underdevelopment and still the grid computing is present in its early stage.

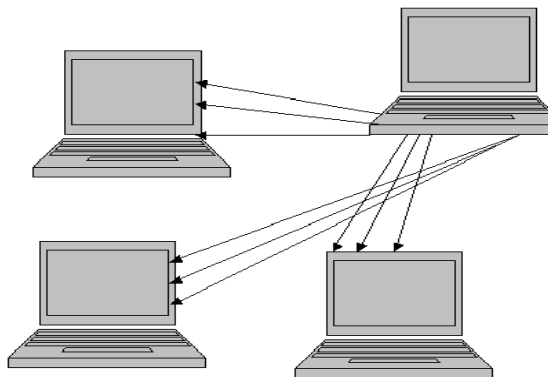


Fig. 2: Resources Allocation In Grid Computing.

Restrictions can be made for example in security networking all the resources are surely not to shown to all of its users so there grid makes some resources available to some of its users. It depends on the configuration of the grid network. The grid computing also depends on the requirement like in the above case the requirement is security that should be provided by grid computing so that its user satisfies.

II. GRID COMPUTING COMPARED WITH CLOUD COMPUTING

A. Upcoming Technologies

Although it is a fact that grid computing and cloud computing both are the future technologies of computing that have their own great impact on the world. But often the grid computing is being thought to be similar to cloud computing which is totally wrong.

B. Similarities

Off course these two technologies have some similarities in them. Both have the concept to make the computing powerful tool for the network to maximize utilize the resources. But both should be taken in different sense and not be mixed with each other.

C. Differences

Both the computing are examples of distributed computing. But in fact the cloud computing in fact has the concept of object oriented programming which makes it difference approach from grid computing.

III. SMALL ISSUES AFFECTING GRID COMPUTING

A. Security

So security becomes an important factor in the grid computing. If the security of grid is weak then nobody will off course like to use the grid, as its all data will be on high risk it could be hacked and could be use for illegal purposes. So the grid will make sure that if any information is been transferred it should have protection from viruses, access of information will be given to correct identifier, if data changes by mistake then the backup will be available in case to recover the data. The record of sent and received data should be kept so in case of any problems the record will be available.

The grid computing increases the efficiency of a network in which some machines are not being used completely. It means that the processor is only used less then 20% and thus it remains idle mostly. The grid computing makes those machines perform more work and it decreases the time of those machines to remain idle, so more work is taken through grid computing.

B. Space

If the space factor is considered it is come to known that grid computing works there also as it increases the performance of the network. How? The answer is simple as all the space of the machines is not used there is sometimes free space left in the hard disk. Grid computing merges all the free space of those machines so the network becomes more powerful as compared to single machine. This makes the network to execute applications containing huge amount of data as they are difficult to tackle on single machine.

The use of internet is increasing rapidly day-by-day all over the world also the computers are becoming powerful as the speed is increasing and the cost of the tools which are being used in computing is decreasing which is introducing the new ways of computing and one of them is grid computing. Grid computing will arise soon in the upcoming years.

Although grid computing has many complexities, which need to be resolved, but it still has more efficiency as it is not a new predicament because the new technologies in the beginning always have these aspects and also grid computing is superior in sense the projects that can't be resolved at local resources are been tackled easily and accurately through it.

Grid computing takes more use of the computing resources in less time and thus increases the speed and saves time, which is really important for industry as both are the requirements of industry. That makes it a great factor for the betterment of an industry. [2] Microsoft, Visual Studio .NET Product Information, Case Studies, "Newport News," March 25, 2002. <http://www.microsoft.com/resources/casestudies/ShowFile.asp?FileResourceID=1598>

Today as everyone knows that there is a lot of competition in every filed of the world so every company wants to give greater benefits such as low cost, save time by increasing speed and good communication skills. Grid computing is expected to provide all these necessary features soon in upcoming years.

C. Smaller Applications

There are some applications that take a long time to execute; grid computing as it uses a network of computers could run that application in shorter time. As a number of users can access the network of grid computing as the consumption of computing resources are maximum. So one can say that grid computing saves time and also its takes maximum use of given resources then the simple computing does.

One of the best use of grid computing is for those applications, which take long time to run, contain large amount of data and it runs repeatedly and it do not runs without distribution into several execution components. Grid computing works in above case due to parallel computing infrastructure.

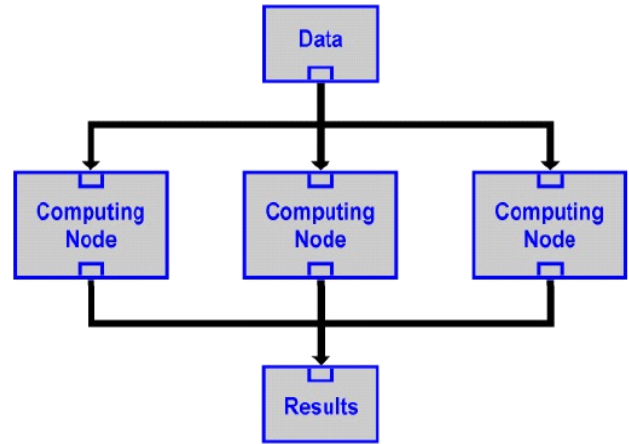


Fig. 3: Reference: Robert W. Lucke: Building Clustered Linux Systems. Prentice Hall PTR September 2004.

IV. FUTURE OF THE GRID COMPUTING

What is grid in future? It is expected that in this world millions of pc anywhere from Antarctica to Australia will be connected to one single network and everyone will be allowed to fully use the network in the way he desires. Also the computers will be of all kinds they could be laptops, ipaqs, pcs and supercomputers.

As we don't care that the electricity we are using is coming from what place, one will also don't know that the network he is connected to is where but he'll only take his work form that network. One will only pay for the grid he's receiving and the way he's using.

Grid computing makes huge collection on data distribute all over the world, which provides great comfort to engineers and scientists, as they will use that from anywhere around the world so it will create the situation as they are in their own office or laboratory. The grid computing could be also composed of small network. The whole network of grid computing could be made only for a single purpose too.

A. Where Grid Computing Suffers

The grid-computing network could consume more time in a situation in which some parts of a task are distributed among various machines because different machines have different characteristics like speed, capacity. If a machine is slow and others are relaying on its work then they have to wait which would waste time.

Many issues like protein folding, financial modeling, earthquake simulation will be solved by help of grid computing in future. The grid technology works in both commercial and non-commercial fields.

Also if a machines space is not enough then again errors will arise. Like if a C++ code is been made in network then if there is windows vista installed on any one pc will cause big problem as it does not supports the libraries of C++, so to use that machine the operating system will had to be changed which will waste a lot of time.

A bug in one machine will not let it work properly. So the point is that a task should be distributed in different machines in the way that they do not rely on each other.

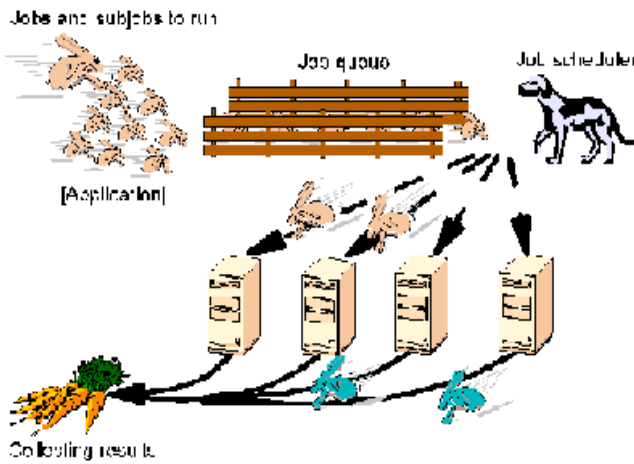


Fig. 4: The Grid Computing Look In Various Fields Of World. Reference: www.grid.org

V. EXISTING SYSTEMS

Grid computing has many projects currently running in various fields like educational, scientific and technical computing. Well they are currently in the state of been at very starting level but they are rapidly going towards their goal. In industry the grid computing is expected to play a tremendous role. Also grid computing will affect the ebusiness and will make it a beauty.

A. Globus

In 1996 a project of grid computing named as Globus came into being. Many universities made a cooperative effort for the start of Globus. Actually the Globus was made for the purpose of making Grid computing understandable for the people. For example if the complete environment of grid computing in network is available and one wants to run an application on that environment, then some queries come into being like the available assets for running his application correctly are strong enough to handle, the grid is configured properly, what is the security level of grid, when is the correct time to use grid, what tool will be used for exchanging the information with respect to grid and finally is the check been made on grid that makes sure that his work is been performed

in the correct way and will lead his way to his goal. The Globus was founded to solve all these questions.

B. Wista

WISTA has some projects related to grid computing and for that purpose it is dealing with international organizations to analyze the grid computing. The real aim of WISTA is to use the grid computing for policies making of governments instead of technology related fields.

C. Geophysics

In the field of geophysics the grid computing is helping the scientists to research on the satellites and also a huge amount of data currently is been downloaded and shared through it. The physicists are using grid computing as it helps them to analyze the earth in a better way.

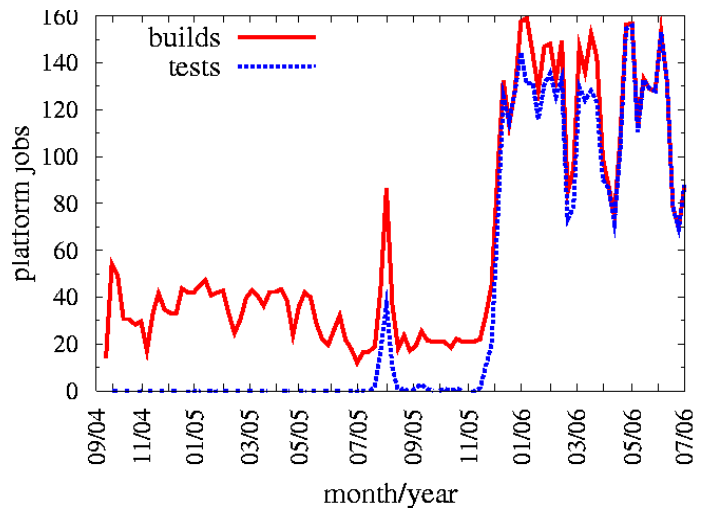


Fig. 5: Progress Of Grid Computing In World. Reference: Walter: Messen, Steuern, Regel mit ARM-Mikrocontrollern. Franzis Verlag 2004.

D. Grid Computing Use In 3d World

The 3D world of gaming has also been exaggerated by grid computing. A game naming there.com uses the environment similar to grid computing. In this game an attempt was made to present a situation in which a reality meeting is been held among humans. The platform used for the making of that game was grid computing.

The maker of that game related that the idea of making that game with use of grid computing finished his game in a better and easy way then ordinary way of using the traditional server. He also stated that as the game consists of communication of humans by using that grid computing that process of communication became simpler and easy. So it can be concluded from that game that the future of grid computing also looks cool in gaming zone of 3D graphics.



Fig. 6: Grid Computing Used In Game 'There.Com'
Reference: www.3dgamingzone.com/grid

VI. RESEARCH AREAS IN GRID COMPUTING

A. Challenge

The challenge today is to find a real system of grid computing in which task is distributed among different machines in which the resources are best utilized and the output is really very much efficient. The network should be good enough to handle problems that arise due to the lively characteristics of resources. A lot of research is been done for that purpose but still the required work is not fully achieved.

As the idea of grid computing is very much similar to that of super computer, so research on supercomputers could introduce new ideas in the grid computing. It can be possible in future that grid computers network can make supercomputer a part of history due to their efficiency but it requires a lot of research and is looking very far away to come in upcoming years. But finally it this technology will also come and will make the world to think at least one time of it.

B. Grid Computing Concerning Researchers

According to some of the researchers the grid computing is one of the ten topmost and great upcoming technologies of the world. The grid computing is given such importance due to some facts like the one is that grid computing has the power to effect the world as electricity when came into being has effected the world.

C. How To Make Grid Compute Reinstate Internet

The Internet gained popularity, as it was easy to access it and also its cost was very much affordable. That result the speed of Internet started increasing and that caused the users to take interest and also to boost. So if the grid has a dream to

replace the Internet it has to make sure that the complexity of installing and maintaining the grid becomes easy for normal people.

D. IBM Promotes Grid Computing

One of the projects regarding grid computing is the World Community Grid. The purpose of the World Community Grid is to serve humanity by making a grid system that is largest of his type. IBM is providing the necessary tools for that project. Some tools are free software's, procedural analysis and capability to build the communications. Also IBM is also agreed to provide its help for preservation, hosting and support for that project.

E. Databases

Grid computing can be used to watch out databases. But in that case also it requires a great research to make security of the grid computing strong enough to handle hackers to gain access to data because some data is of great importance and its loss could cause horrible results. Also no one wants its privacy to be visible to other people. Another factor on the database is of the space, as databases need huge space to be kept. The speed also matters in this stage, as the data can be need to transferred to other place. All these areas of database dealing with grid computing can be improved by research.

F. Business World

The business is looking to be effected by grid computing as the research is going on for the grid computing. The new projects related to grid computing have a lot of importance as it is expected that they will play the same role in the economy of our world in 21st century like the one played by electricity in 20th century. Probably the economy of the world will have great impact by grid computing and will move many steps forward in a short time.

G. Grid Computing After Short Time

In the next two upcoming years it is been expected that in organizations and commercial sectors grid will be entered as "Enterprise grids". Although the grid computing at that level will be limited and it would be used as some links to control external grids or can be used behind the firewalls. At that level better approach will be to use grid computing in Internets business.

H. After Many Years

Grid computing projects are in a stage of under development in the world. Several firms, certified organizations, educational universities and different researchers are interested in developing those projects. For example European community (EU) is supporting a grid-computing task for the sake of high-energy physics, earth

observation and biology purposes. [3] http://www.e-nc.org/pdf/grid_report_oct-28-03.pdf



Fig. 7: Grid Computing Can Hold Whole World.
 Reference: www.gridcomputing.com/world.

National technology grid is sponsoring many projects of grid computing for people's betterment. The grid engine software is been tried to invent by sun Microsystems. Grid computing is today used in National Science Foundation's National Technology Grid, NASA information Power Grid, Pratt & Whitney, Bristol-Myers and Squibb Co. [4].

Grid computing after five years is expected to use for interfaces like gaming-zone broadband and a bit also in industrial zone [5], [6], [7]. All that approaches will lead down the grid computing to get more importance then before and replace many of old technologies.

I. Expected Destiny To Grid Computing

The final goal of grid computing will be that it will become a necessary tool for business to get his success. It will provide new products and will help in communication between the organizations and the customers. Also the internet will completely buried away be the use of grid computing in the world.

Grid computing if becomes strong enough to provide the real privacy and security to its user then it will be taken on in the commercial zone. Also the grid computing has to provide easy and reasonably priced access to Internet. All that work is difficult but as nearly nothing is impossible in our world so grid computing will also able to fulfill his requirements in the future.

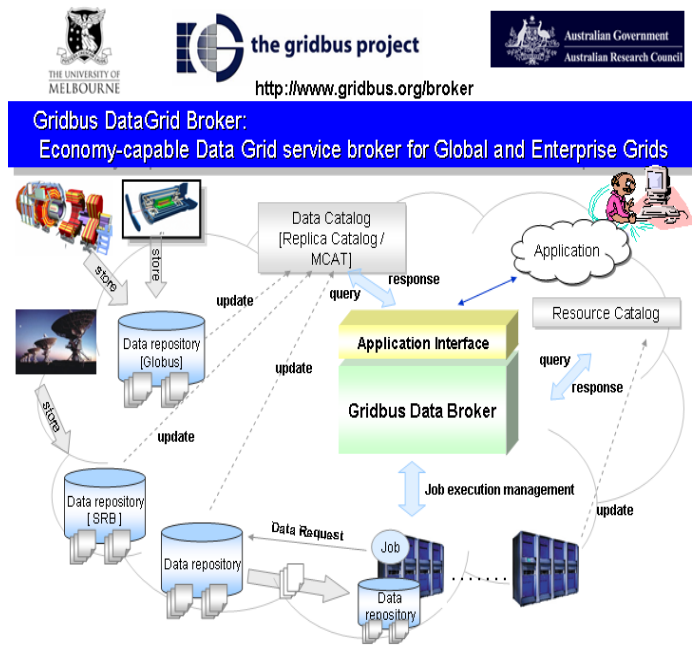


Fig. 8: Gridbus A Project Of Grid Computing.
 Reference: www.eece.unm.edu/~apm/docs/APM_GridRPC_0702.pdf

VII. CONCLUSION

A. Why Grid Computing

In reality the work on the grid computing was started with the aim of making such a network consisting of computers which will be independent of the server connected to its central point, but unfortunately that dream has not been able to come into being yet. But still it is strongly believed that one day grid computing will be able to fulfill all requirements that are used to display its importance.

Grid computing is gaining more importance as the days are being passed. Its usage is increasing. In starting grid computing was only made for the purpose of science related fields but now a day it is believed that industrial and commercial zones can be grown by use of grid computing. In future the grid computing would be used for those purposes which so far are invisible to scientists and researchers [7], [8].

B. The Bona Fide Requirement

The challenge today is to find a real system of grid computing in which task is distributed among different machines in which the resources are best utilized and the output is really very much efficient [9]. The network should be good enough to handle problems that arise due to the lively characteristics of resources. A lot of research is been done for that purpose but still the required work is not fully achieved.



Fig. 9: Grid Computing Computers Linked With Node.

It has been already discussed that grid computing is in its early stages. So the real position of grid computing has not been evaluated yet. But there are huge expectations from grid computing as it is of really some importance. In the future one will see how much grid computing works and get success.

C. Grid Computing Less Than Half Century

The grid computing is not very old it has just been nearly about fifty years his concept came into being. Some problems arise if grid computing is used in markets and the solution of those problems is not yet found. Like an important purpose of industry is to progress in such a form in which the information is less been exposed.

D. Organizations Grid Computing

The grid computing will perk up the costs for organizations and will also make the yield smart. It will utilize the computing resources of a network in better ways so they are used more in ideal way instead of being used in an idle way [9], [10]. Also the time resources become better due to grid computing. Grid computing will become an essential technology in upcoming years for market and commercial uses. It is been expected that its requirement will rapidly increase.

The grid computing helps a project to complete in less time as it is not dependent on its server. The grid computing satisfies the real thought of computing which is that a high and great performance is not an issue but the real thing is to achieve the necessary output in short time.

E. Markets

If markets are established in the way that suits grid computing then obviously the use of grid computing will be

accelerated. As instead of organizations market provides easy way to allocate computer resources in price. Well the market grid thought is not new but it has not been progress that was required to gain fame for grid computing in the case of markets.

F. Grid Computing In Biology

In the field of biology grid computing has not been successful so far due to some facts e.g. the research in this fields requires great computing power and that power is not achieved yet but in future it could be attained as the grid computing looks great. The research for the field of biology is often strictly team based and their projects are frequently carried to the countries all over the world and in some areas there is no sign of computing. But still grid computing has its importance in the field of biology that can't be ignored or neglected.

Grid computing is still a theoretical concept and one does not knows when it will be fully adopted by the world. But the good thing is that the developers of it are confident that it will be welcomed well and it will gain fame in short time. As the grid computing looks to be an excellent substitute for the internet so there are chances that grid computing will arise very much.

G. Parallelism Issues

Simple parallelism is supported by grid computing in accurate way. But still there is unknown that how will the grid computing be able to support the system having complex dynamic parallelism. But this is not a big issue because if the grid computing fails to provide put up to those systems then as the time will pass and grid computing will grow stronger and will support those networks one day.

So it is a good idea to think of grid computing to become essential for the world in the days to come. As nearly all fields or one can say that the whole world will be exaggerated by grid computing but still and yet it is just a dream, which has to come true in future to make the worlds progressing faster. Also the commercial zone is expected to become addict of grid computing as it will make the organizations change the way they are now.

Finally if the grid computing as discussed really has to become a power that is the next generation of Internet and wants to replace it then the complications in fixing and sustaining it should be less and less because one should keep in mind that internet gained fame due to its ease of availability and access, which made it really a great power in the field of computing that hasn't been able to gain low and is instead becoming popular day-by-day.

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