



# AN INTRODUCTION TO GRID COMPUTING

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## Abstract

**Grid computing environment is not a static Environment so The performance of grid is varies time to time .In Today's world ,various complex tasks done every day in different scientific areas so there is need of a lots of computational power to solve different types of complex scientific problems . Although Humans have good brain but still cannot able to solve complex scientific problems as computers can. In these Situation Grid's High performance computational environment is good Solution. Performance of Grid is based on various Constraints as the resource's bandwidth, Resource's computational power, File size of jobs, the locations of components and so on. In this paper I am giving a general introduction of Grid Computing and its two broad areas: Resource Scheduling and Job Scheduling.**

**Keywords: Grid Computing, Resource scheduling, Job Scheduling.**

## I. INTRODUCTION

Today is the era of modern computing. In this age we require huge amount of computational power to solve many scientific problems. As the Size of the problem and Complexity of the problem increases, there is need of a lots of resources in single environment and today's these environment is called Grid Computing environment. Generally a computer have good computational power but it is underutilized .We can use these underutilized computational power and apply it where the huge computational power is basic need for processing.

A definition of the Grid indicated by Ian Foster is “a system that coordinates resources which are not subject to centralized control, using standard, open, general-purpose protocols and interfaces to deliver nontrivial qualities of service” [1].

Grid bus Project defines Grid as “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 user's quality-of-service requirements” [2].

Definition given by The Globus Project is “an infrastructure that enables the integrated, collaborative use of high-end computers, networks, databases, and scientific instruments owned and managed by multiple organizations” [3]

### A. Working of Grid Computing

Grid computing is a collection of large amount of resources. At a particular time, some resources are available and others may busy doing tasks. Following are some basic terms used in Grid computing:

**Resources:** These are responsible for performing jobs.

**Grid Information Service (GIS):** GIS having information of all registered resources of Grid Environment.

**Grid Resource Broker:** it distributes the jobs to available resources according to the algorithm.

**User:** Who submits Jobs in Grid Environment

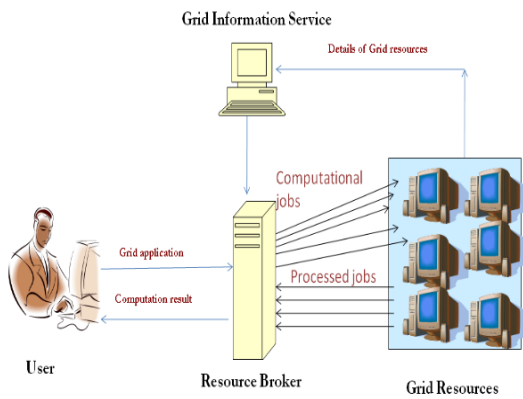


Figure 1

In the grid environment first of all, each resource should be registered in Grid. After the registration of resources, GIS having not only information of resources but also the current status of resources either the resource is available for processing or it is busy. In the next step GIS provides this information to resource broker at the time of processing of jobs. When user submits his job to grid environment first it goes to the resource broker. As per the request of Resource broker to GIS, GIS provides the list of available resources to Broker. Resource broker uses the specified algorithm and distributes the jobs to the available resources. After the successful completion of jobs, result comes to broker. Now finally Resource broker gives the result to user.

### B. Types of Grid

On the basis of use grid computing can be divided into different types [4][5]:

**Computational grids:** Computational grids are used for accessing Resources securely. They divide the tasks into various resources and execute them parallelly.

**Collaboration grid:** Good Collaboration is basic need of today's modern Computational generation. Collaboration Grids perform best in these situations.

**Utility Grid:** Utility Grids share CPU Cycle, Special Peripherals and Software.

**Network grid:** Strong network communication is basic requirement in Grid. Without the good Communication of network high computational power resources also cannot perform its level best. These type of grid overcome the poor network communication problem and provide high communication between nodes.

**Data grid:** These type of grid provide the storage of data.

## II. ADVANTAGES OF GRID COMPUTING

There are various advantages [6] of Grid as:

**Exploiting underutilized resources:** Grid computing collects the computational power from unutilized resources and uses them for computational purpose. The resources which are in idle state, computational power of that resources are used in Grid Computing.

**Parallel CPU capacity:** In Grid Jobs are executed parallel so it dramatically reduces the total execution time of jobs. Jobs are first distributed into various available resources and then executed parallel.

**Virtual resources and virtual organizations for**

**Collaboration:** In Grid computing environment, Virtual organization indicated the user of the grid. In Grid, resources can be shared virtually to virtual organization.

**Access to additional resources:** Whenever there is a need of additional resources for computing, grid provides the additional one. It seems us Grid, as a large collection of resources.

**Resource balancing:** Each resource should register in grid for processing. Grid has information of availability of resources. As per the capacity and availability of the resource, Jobs can be distributed to various resources.

**Reliability:** Grid is highly reliable in terms of failure. Jobs in grid can automatically resubmit to other resources if there is any kind of failure occur at one location.

**Management:** As the Grid computing environment is heterogeneous environment so better management is essential. Grid provide a better management not only for jobs but also for resources.

## III. RESEARCH FIELDS OF GRID

There are lots of research has been done in the area of Grid Computing. The various challenges [5] to the grid are the following:

- Grid reliability:
- Scheduling of tasks
- Load balancing
- Resource monitoring
- Service availability

- Distributed management [1]
- Availability of data
- Uniform user friendly environment.
- Grid application development
- Standard protocols
- Efficient algorithms and problem solving methods
- Programming models and tools
- Management and administration of grid
- Performance analysis and resource monitoring
- Centralized management

#### IV. APPLICATIONS OF GRID

Authorization, Authentication, Resource Access and Resource Discovery are four procedures [5] which must be used in distributed computing before the Grid. These four procedures plays major role in sharing concept of resources in Grid.

Major benefits which can be utilized by application of grid are the following [5]:

- Improved efficiency/reduced costs.
- Optimized utilization of underutilized resources.
- Exploiting underutilized resources
- Virtual resources and Virtual Organization (VO)
- Increase capacity and productivity
- Parallel processing capacity
- Resource balancing
- Heterogeneous system support
- Reduced time of result.

#### V. SECURITY

Specific terminologies are used in the area of security. The International Organization for Standardization (ISO) has defined the common security services found in modern IT systems [5]. For understanding the security more clearly following terms are listed:

**Authentication:** Authentication [8] is the process of determining whether someone or something is, in fact, who or what it is declared to be. Logically, authentication precedes authorization (although they may often seem to be combined). The two terms are often used synonymously but they are two different processes.

**Access control:** Access Control [9] is any mechanism by which a system grants or revokes the right to access some data, or perform some action. Normally, a user must first Login to a system, using some Authentication system. Next, the Access Control mechanism controls what operations the user may or may not make by comparing the User ID to an Access Control database.

**Data integrity:** Data integrity [6] assures that data is same it is not changed.

**Data confidentiality:** Data should be secure and confidential. Data confidentiality [6] assures this.

**Key management:** Key Management [6] is responsible for Keys in Cryptography.

#### VI. GRID SIM TOOL KIT

One of the ways to implement Grid algorithm is Grid Sim tool kit [10]. It provides heterogeneous environment for resources. There are lots of methods available for simulation of grid computing. we can directly measure the Job's Finish time, Execution time etc. in Grid. As per the requirements we can create both random as well as manual type of jobs in Grid. Many virtual organizations can submit their jobs simultaneously to the same resource which may be space shared or time shared. We can also specify network speed of resources in Grid Sim.

#### VII. CONCLUSION

Grid Computing is a new generation of computing. It solves a lot of computational problems in research area. It works faster and gives accurate results. Grid computing helps us in various fields. It reduces the processing time dramatically. Grid Computing is very useful for computing type operations.

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