19CSE310 GRID AND CLOUD COMPUTING

UNIT I INTRODUCTION

Evolution of Distributed computing: Scalable computing over the Internet – Technologies for network based systems – clusters of cooperative computers - Grid computing Infrastructures – cloud computing - service oriented architecture – Introduction to Grid Architecture and standards – Elements of Grid – Overview of Grid Architecture.

Introduction to Grid Architecture and standards:

- Grid computing is applying the resources of many computers in a network to a single problem atthe same time
- Grid computing technologies & infrastructure support the sharing & coordinated use of diversresources in dynamics, distributed virtual organization.
- Grid architecture identifies the fundamental system components, specifies purpose and functionof these components and indicates how these components interact with each other.
- The grid can be thought of as a distributed system with non-interactive workloads that involve alarge no of files.
- The different Grid computing from conventional high performance computing system such ascluster computing is that grid to be more loosely coupled, heterogeneous& geographically dispersed.
- Grids are often constructed with general purpose grid middleware software libraries.

GRID COMPUTING ARCHITECTURE:

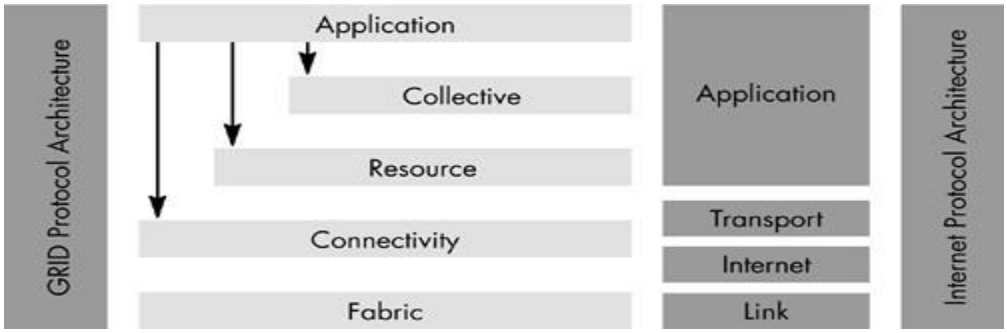

Figure : Grid Computing architecture

ADVANTAGES OF GRID COMPUTING:-

- No need to buy large symmetric multiprocessor server.
- Much more efficient use of idle resources.
- Grid environment are much more modular and don't have single point of failure.
- Polices can be managed by the grid software.
- Upgrading can be alone.
- Jobs can be executed in parallel speed.

DISADVANTAGES OF GRID COMPUTING:-

- For a small memory applications memory passing interfaces you may need to have a fastinterconnect between the computer resources.
- Some application may require full advantages of new model.

- Political challenges associated with sharing resources.

GRID COMPUTING STANDARDS:

a) **OGSA (Open Grid Service Architecture):** The aim of OGSA is to standardize grid computing and to define a basic framework of a grid application structure. Some of the key concepts are first presented byIan Foster who still leads the OGSA working group. This Architecture combines different aspects from grid computing with advantages from Web Services.

b) **OGSA Services:** The OGSA specifies services which occur within a wide variety of grid systems. They can be divided into 4 broad groups: i) Core Services ii) Data Services iii)Program Execution Services and
iv) Resource Management Services.

c) **OGSI (Open Grid Service Infrastructure):** OGSA defines a Grid Application and what a Grid Serviceshould be able to do. OGSI specifies a Grid Services in detail.

d) WSRF (Web Service Resource Framework): WSRF is a derivative of OGSI. A first implementationcan be found in GT4 (Global Toolkit 4). The framework combines 6 different WS specifications "that define what is termed the WS-Resource approach to modeling and managing state in a Web services context. WSRF Specifications: i) WS-ResourceLifetime: mechanisms for WSRessource destruction ii) WS- ResourceProperties: manipulation and definition of WS properties iii) WS-Notification: event management iv) WS-RenewableReference: defines updating proceeding v) WS-ServiceGroup: interface for by-reference collections of WSs vi) WS-BaseFaults: standardization of possible failures.

ELEMENTS OF GRID:

Grid computing combines elements such as distributed computing, high-performance computing and disposablecomputing depending on the application of the technology and the scale of operation. Grids can create a virtual supercomputer out of the existing servers, workstations and personal computers.

Present-day grids encompass the following types

- **Computational grids,** in which machines will set aside resources to "number crunch" data or providecoverage for other intensive workloads
- **Scavenging grids,** commonly used to find and harvest machine cycles from idle servers and desktopcomputers for use in resource-intensive tasks (scavenging is usually implemented in a way that isunobtrusive to the owner/user of the processor)
- **Data grids,** which provide a unified interface for all data repositories in an organization, and through which data can be queried, managed and secured.
- **Market-oriented grids,** which deal with price setting and negotiation, grid economy management and utility driven scheduling and resource allocation.

OVERVIEW OF GRID ARCHITECTURE:

The architecture of a grid system is often described in terms of "layers", each providing a specific function as shown in the following figure. Higher layers are user centric, whereas the lower layers are hardware-centric. In Figure 1 a generic grid architecture showing the functionality of each layer.

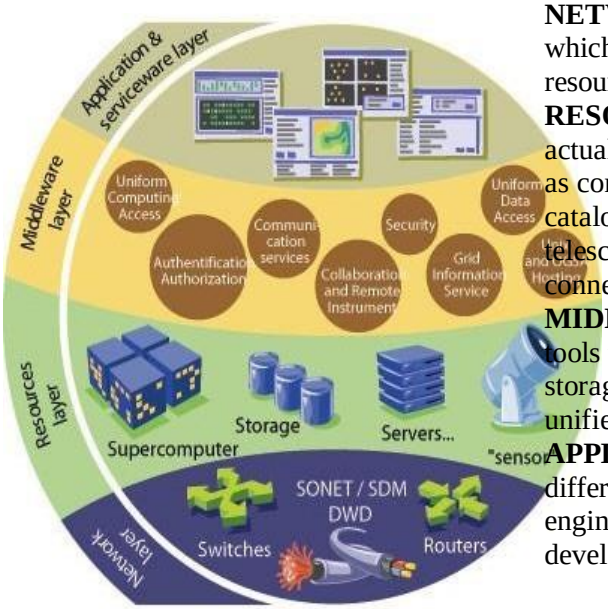

Fig :Grid Layer Architecture

NETWORK LAYER: It is the bottom layer which assures the connectivity for the resources in the grid.

RESOURCE LAYER: It is made up of actual resources that are part of the grid, such as computers, storage systems, electronic data catalogues, and even sensors such as telescopes or other instruments, which can be connected directly to the network.

MIDDLEWARE LAYER: It provides the tools that enable various elements (servers, storage, networks, etc.) to participate in a unified grid environment.

APPLICATION LAYER: In which includes different user applications (science, engineering, business, financial), portal and development toolkits-supporting applications.

Types of Layer & its Function

MAIN CHARACTERISTICS OF GRIDS:

The main characteristics of a grid computing environment can be listed as follows:

- **Large scale:** A grid must be able to deal with a number of resources ranging from just a few to millions.
- **Geographical distribution:** Grid resources may be spread geographically.
- **Heterogeneity:** A grid hosts both software and hardware resources that can be ranging from data,files, software components or programs to sensors, scientific instruments, display devices, personal digital organizers, computers, super-computers and networks.
- **Resource sharing and coordination:** Resources in a grid belong to different organizations that allow other organizations (i.e. users) to access them. The resources must be coordinated in orderto provide aggregated computing capabilities.
- **Multiple administrations:** Each organization may establish different security and administrative policies under which resources can be accessed and used.
- **Accessibility attributes:** Transparency, dependability, consistency, and pervasiveness are attributes typical to grid resource access. A grid should be seen as a single virtual computing environment and must assure the delivery of services under established Quality of Service requirements.