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Comparison of Cloud Computing and Grid Computing: A Review

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***Abstract*—** Cloud computing emerges as one of the hottest topic in field of information technology. Cloud computing is based on several other computing research areas such as HPC, virtualization, utility computing and grid computing. This topic discusses the grid and cloud computing in basics techniques. Typically, a grid works on various tasks within a network, but it is also capable of working on specialized applications. It is designed to solve problems that are too big for a supercomputer while maintaining the flexibility to process numerous smaller problems. Cloud computing is the delivery of computing services services–servers, storage, databases, networking, software, analytics, intelligence and more-over the Internet("the cloud") to offer faster innovation, flexible resources and economies of scale.

***Keywords*—**Bandwidth, Software as a Service, Wide area Network, deployment, Middleware.

I. INTRODUCTION

A grid is connecting by parallel nodes that form a computer cluster, which runs on an operating system, Linux or free software. The cluster can vary in size from a small work station to several networks. The technology is applied to a wide range of applications. Such as mathematical, scientific or education tasks through several computing resources. It is often used in structural analysis, web services such as ATM banks, back-office infrastructures and scientific or marketing research. Cloud computing proponents points to it being a new paradigm in software development where smaller organization has that were only available to large enterprises.

CLOUD COMPUTING

Cloud computing has three basic components as follows:-
Client Computers: The end user can interact with the cloud using the client computers.

Distributed Servers: The servers are distributed among the different places but acts like they as working with each other.

Data Centres: Data centres are the compilation of servers.

II. SERVICES OF CLOUD COMPUTING

Software as a Service (SaaS): The way of carrying application as a service on the internet is known as software as a service. In place of installing the software on his computer, the user can simply access it via the internet [5]. It makes the user free from managing the complex software and hardware. The SaaS users do not need to buy software or hardware, maintain, and update. Example, Microsoft Office 365, Google Apps etc.

Platform as a Service (PaaS): A development environment or platform is given to the consumers as a service in PaaS, upon which user can deploy their own software and coding. The customer has the liberty to construct his own applications that can run on the provider's infrastructure [6].For example, LAMP (Linux, Apache, MySQL, and PHP), J2EE, Ruby etc.

Infrastructure as a Service (IaaS): Many computing resources are provided by the IaaS in the form of storage, network, operating system, hardware, and storage devices on demand. IaaS users can access the services using a wide area network, such as the internet [7]. For example, a user can create virtual machines by login to the IaaS platform.

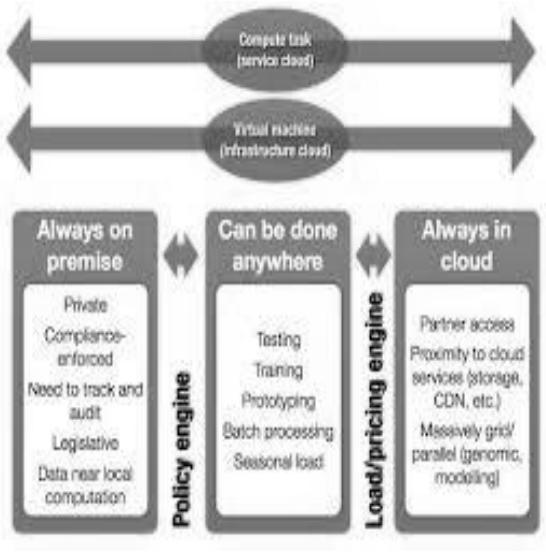

Fig-1: Cloud Computing Services

TYPES OF CLOUD COMPUTING

Public Cloud: The public cloud is a computing service supplied by the third party providers atop the public internet [6]. These services are available for any user who wants to use them and they have to pay only for the services they consumed.

Private Cloud: The computing services provided over the internet or private network come under the private cloud and these services are offered only to the selected users in place of common people [1,6]. A higher security and privacy is delegated by private clouds through the firewall and internal hosting.

Hybrid Cloud: Hybrid cloud is the combination of public cloud and private cloud. In the hybrid cloud, each cloud can be managed independently but data and applications can be shared among the clouds in the hybrid cloud.

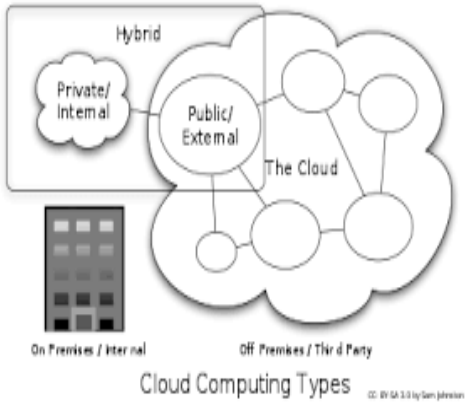

Fig-2: Cloud Computing Types

III. CLOUD COMPUTING FEATURES

Cloud computing brings an array of new features and advantages compared to any other computing paradigms. There are briefly described in this section.
users on demand.

Fig-3: Cloud Features and Challenges

The resources are scalable over several data centers.

- CPU performance, bandwidth, and memory capacity.
- Well established interfaces such as Web services and Web browsers.
- However, software and data inside clouds can be automatically reconfigured and required.
- Users may pay and use or pay for services and capacity as they need them.

IV. GRID COMPUTING

Grid computing is characterized by the large scale sharing and cooperation of dynamically distributed resources such as, CPU cycles, communication bandwidth, and data to constitute a computational environment. In the grid dynamic environment from the application point of view two issues are of prime important: performance - how quickly the grid computing system can complete the submitted task and trust worthiness.

V. CHARACTERISTICS OF GRID

The main characteristics of a grid as follows:

Decentralized control: Decentralized control on the resources and enables different administration policies and local management systems within the grid.

Open technology: A grid should use of open protocols and standards.

High quality service: A grid provides high quality of service in performance, availability and security.

GRID ARCHITECTURE

Grid architecture developed for the establishment, management and cross-organizational resource sharing within a virtual organization. It identifies basic parts of grid, defines the roles of components and shows each component interacts with one another. This layered grid architecture and its relationship to the internet protocol architecture.

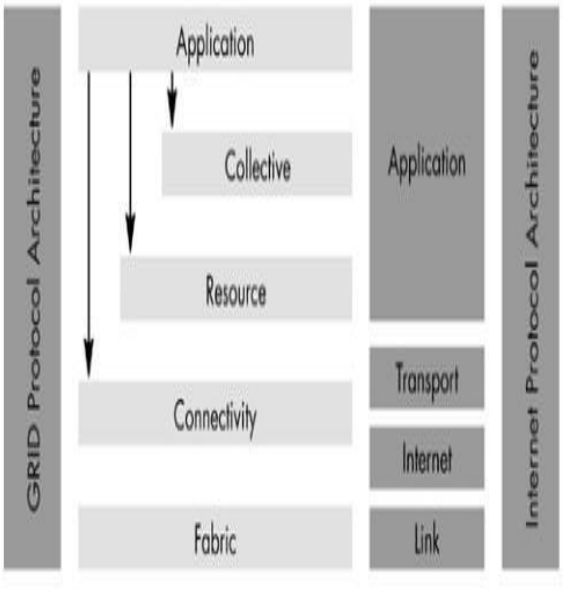

Fig-4: Grid Architecture

Fabric Layer: It defines the resources which are shareable. It includes data storage, networks, catalogs and other computational resources.

Connectivity Layer: It defines the core communication and authentication protocols needed for grid-specific networking services.

Resource Layer: This layer uses the communication and security protocols defined by the networking communications layer, to control the secure negotiation, initiation, monitoring, metering, accounting and payment involving sharing across individual resources.

Collective Layer: It is responsible for all global resource management and interaction with a collection of resources. This protocol layer imposes a wide variety of sharing behaviors using a few Resource layer and Connectivity layer protocols.

Application Layer: These are user applications, which formed by using the services defined at each lower layer. Such an application can directly access the resources, or can access the resource through the Collective Service interface APIs(Application Provider Interface).

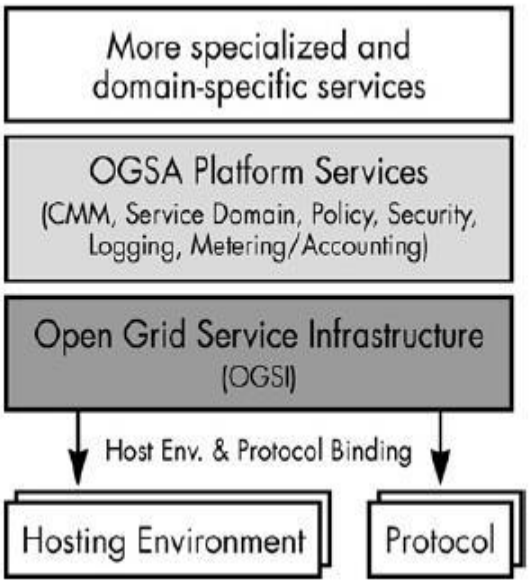

Fig-5: API Protocol Layer

Grid technologies have emerged from some 10 years of research and development in both academia and industry, which further continues today. we can distinguish four distinct phases in this evolution.

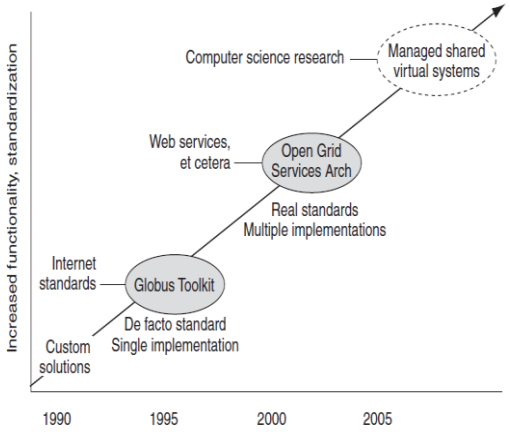

Fig-6: Grid Evolution

Grid Types

Computing grid: This grid designed to provide as much computing power as possible. This environment usually provides services for filing, surveying and managing jobs. In a computational grid most machines are high-performance servers.

Data grid: A data grid stores and provides reliable access to data across multiple organizations. It manages the physical data storage, data access policies and security issues of the stored data.

Service Grid: A service grid provides services that not covered by a single machine. It connects users and applications into workgroups and enables real-time interaction between users and applications with a virtual workspace. Service grids include on-demand, collaborative and multimedia grid systems.

CHALLENGES OF GRID COMPUTING

The most important challenge in grid is to handle variation present in the infrastructure. Complexity arises because of the decentralized control, underlying hardware and software resources. It also arises to deal with faults in grid, grid middleware such as resource broker, security and privacy mechanism, local policies and usage patterns of the resources and so on. Programming in Grid environment introduces new challenges that not faced in parallel computers, such as multiple administrative domains, new failures, and large variations in performance.

VI. CONCLUSION

In this paper, we show that Clouds and Grids share a lot commonality in their vision, architecture and technology, but they also differ in various aspects, so identify challenges and opportunities in both fields.

We believe a close comparison such as this can help the two communities understand, share and evolve infrastructure and technology within and across, and accelerate Cloud Computing from early prototypes to production systems. In this review paper we described in short the introduction, evolution, types and components of cloud computing and also different approaches of cloud computing and some of its advantages. The application area of cloud computing will continuously is increasing. Today approximately all small and big industries are using cloud computing to manage storage, traffic, hardware requirements. So, it is clear that there is major impact of cloud computing on society and business. In building this distributed "Cloud" or "Grid", we will need to support on-demand provisioning and configuration of integrated "virtual systems" providing the precise capabilities needed by an end-user. Some of the required protocols and tools will come from the smart people from the industry at Amazon, Google, Yahoo, Microsoft, and IBM. Others will come from the smart people from academia and government labs. Others will come from those creating whatever we call this stuff after Grid and Cloud. It will be interesting to see to what extent these different communities manage to find common cause, or instead proceed along parallel paths.

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