

# JUXTAPOSITION BETWEEN CLOUD COMPUTING AND GRID COMPUTING

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**Abstract:** *In the current era, Cloud computing has become buzzword. Cloud computing emerges as one of the hottest topic in field of information technology. Cloud computing is the recent invented technology on the network world. Clouds are calculated as a new era of Grid computing. In order to study the importance of cloud computing, we illustrate the characteristics of cloud computing and differentiate it from many other research areas. The service oriented, loosely coupled, fault tolerant, business oriented model and easy to use are the main characteristics of cloud computing. Grid computing is the simplest process of cooperating multiple processors on multiple machines and it also boost the computational power which requires high capacity of the CPU. In grid computing number of servers which have common operating systems and software has interactions among. This paper compare and contrast cloud computing with grid computing from various aspects and give insights into the various important characteristics of both.*

**Keywords:** *Cloud computing; Grid computing; juxtaposition*

## INTRODUCTION

Cloud computing has evolved recently as a new paradigm that delivers IT services as computing utilities for Institutes, companies and enterprises. It has high an influence in IT industries. According to IBM , a cloud is a collection of virtualized computer resources that hosts a variety of different workloads and allows them to be deployed and scaled-out through the rapid provisioning of virtual or physical machines; supports redundant, highly scalable programming models and resource usage monitoring in real time to enable rebalancing of allocations when needed. Number of companies is deciding to use virtual data centres to facilitate infrastructure managing and trying to decrease the need

of hardware maintenance in the company. Clouds to provide services to users and providers needs to be made up for sharing their capability and resources. Clouds are designed to have almost the similar vision of grid computing, nevertheless still there are many differences. Grid is a system that has the ability to manage and organize resources and services that are distributed across many control domains, utilize protocols, interfaces and supply high quality of service. Cloud Computing has been provided by a many large organisations such as Amazon, Google, yahoo and Sun. Amazon is an important organisation in the development of cloud computing. In 2005, Amazon's cloud computing system called Amazon web services has been developed. Amazon was the one of the first organisations to provide cloud-computing facility.

## CLOUD DEFINITION

There is no standard or particular definition for cloud. According to Gartner, cloud computing is a type of computing where massively scalable IT-related capabilities are provided as a service across the cyber infrastructure to external user. It has been stated that cloud systems are narrow Grids, in the consideration of exposing reduced interfaces. However, number of attempts were made for defining Cloud computing by researchers, based on their observation or fundamentals of what will be the probability and the future of cloud computing are going to be Number of experts has proposed several definitions, which give various concepts about the cloud. The table below indicates some of the experts'



TABLE 1 REFERENCE AS EXTRACTED FROM [ 6]

Author/Reference	Year	Definition/Excerpt
M. Klems	2008	you can scale your infrastructure on demand within minutes or even seconds, instead of days or weeks, thereby avoiding under-utilization (idle servers) and Over-utilization (blue screen) of in-house resources...
R. Cohen	2008	Cloud computing is one of those catch all buzz words that tries to encompass a variety of aspects ranging from deployment, load balancing, provisioning, Business model and architecture (like Web2.0). It's the next Logical step in software (software 10.0). For me the simplest explanation for Cloud Computing is describing it as, "internet centric software..."
J. Kaplan	2008	a broad array of web-based services aimed at allowing users to obtain a wide range of functional capabilities on a 'pay-as-you-go' basis that previously required tremendous hardware/ software investments and professional skills to acquire. Cloud computing is the realization of the earlier ideals of utility computing without the technical complexities or complicated deployment worries...
B. Kepes	2008	...Put simply Cloud Computing is the infrastructural paradigm shift that enables the ascension of SaaS. ... It is a broad array of web-based services aimed at allowing users to obtain a wide range of functional capabilities on a pay-as-you-go basis that previously required tremendous hardware/software investments and professional skills to acquire
O. Sultan	2008	...In a fully implemented Data Centre 3.0 environment, you can decide if an app is run locally (cook at home), in someone else data centre (take-out) and you can change your mind on the fly in case you are short on data centre resources (pantry is empty) or you having environmental/facilities issues (too hot to cook). In fact, with automation, a lot of this can be done with policy and Real-time triggers...
B. Martin	2008	Cloud computing encompasses any subscription-based or pay-per-use service that, in real time over the Internet, extends IT's existing capabilities

## CLOUD COMPUTING DEPLOYMENT MODEL

Cloud computing can be divided into the following four famous models

- a) **Public:** Services and resources are reachable to the public by using the internet. Public cloud emphasises the advantages of rationalization, operational simplicity and scalability. The main concern in this type of cloud environment is the security; since this environment is accessible to the public and user data in one stage is hosted by a third party.
- b) **Private:** Services and resources are reachable within an institute. Private cloud emphasises the advantages of integration, optimization of hardware deals and scalability
- c) **Community:** Services and resources are shared by various organizations with a common aim.
- d) **Hybrid:** This type combines the methods from the private and public clouds, where resources can be used either in a public or a private cloud environment [5].



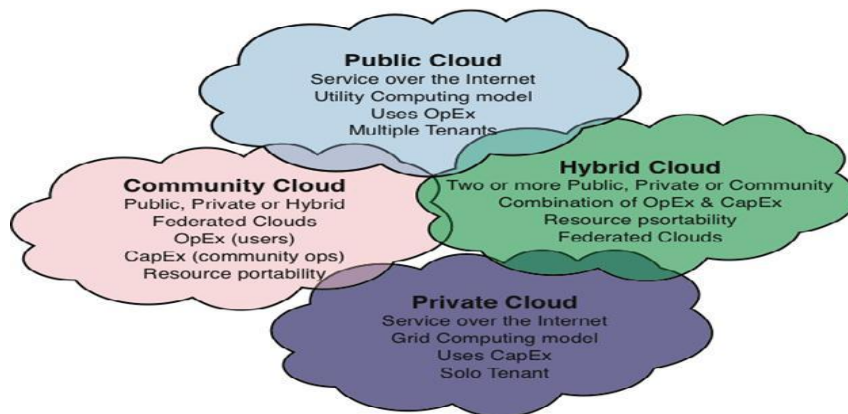


Fig1: Cloud computing models [1]

## CLOUD ARCHITECTURE

Clouds computing consist of various heterogeneous components such as grids, cluster, super computers etc. This system is used by millions of users. Consider, for example the case of Microsoft's Live, where the system has around 300 million users. Added to this, there are almost 330,000 application developers of Amazon EC2. Cloud Architecture consists of software applications, which use Internet-accessible on-demand services. Therefore, these applications are considered as an essential computing infrastructure that is used when it is required (such as processing a user request) and to perform a specific job by giving up unwanted resources. Also drawing the needed resources on-demand (like compute servers or storage).[5]

There are few difficulties of large-scale data processing that are specified by cloud architecture:

- 1) First of all, it is difficult to increase the number of machines to complete an applications requirement.
- 2) It is not easy to have so many the machines when needed by any application.
- 3) It is difficult to distribute and manage a large-scale job on different machines.

## GRID COMPUTING

Grid computing is the collection of resources from number of locations to reach a common goal.

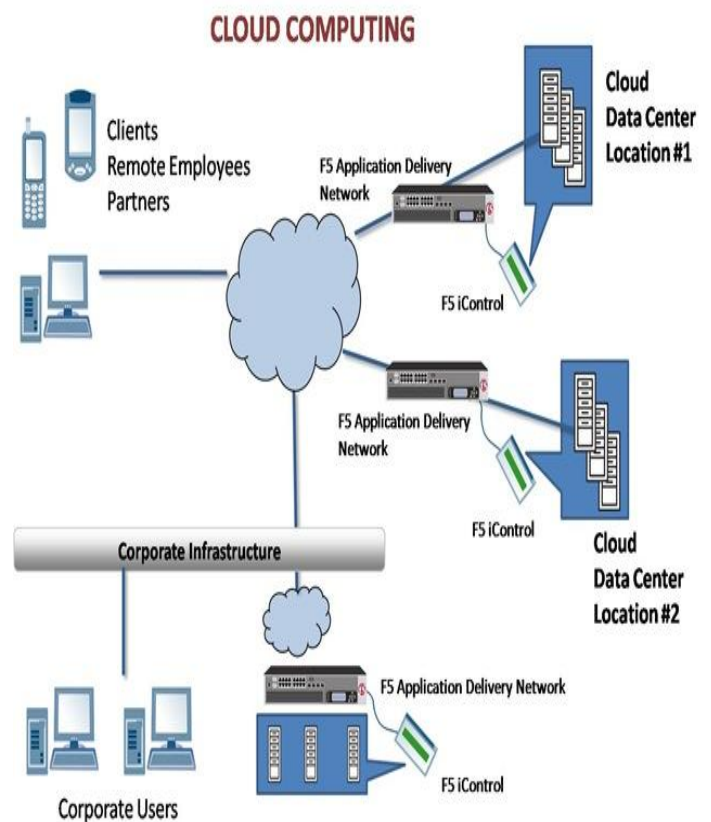


Fig 2: Computing Cloud

The grid can be stated as a distributed system with non-interactive workloads that involve a bulk of files.

### COMPARISON BETWEEN CLOUD AND GRID COMPUTING

Grid computing is the collection of computer resources from multiple locations to reach a common goal[3]. The grid can be thought of as a distributed system with non-interactive workloads that involve a large number of files. Nowadays, it is observed that cloud is a newest paradigm that ensures reliable services delivered via next-generation data centres which are constructed on virtualized computing and storage technologies. The popularity varies from time to time [4]. The internet search popularity, measured by Google search trends during the last year, for “cluster computing”, “Grid computing”, and “Cloud computing” is shown in Figure.

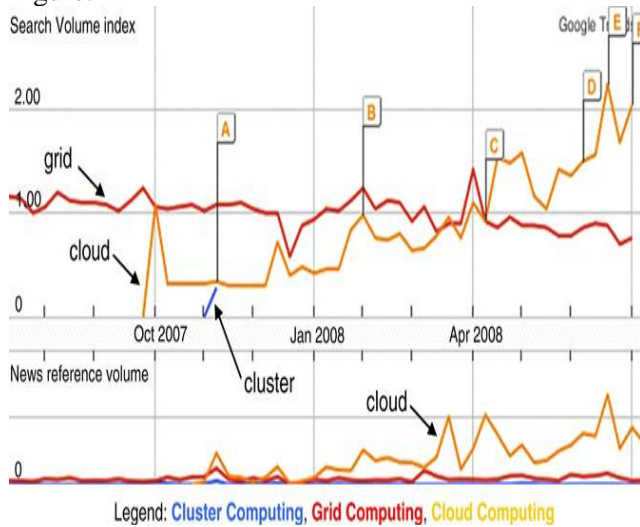


Fig 4: Google search trends for the last 12 months. [7]

From the Google search trends, it has observed that cluster computing was a popular during 1990s, from 2000 grid computing gains popularity and now a days cloud computing started gaining popularity.

#### A) Feature Comparison

There are some of the important features that are common to Cloud and Grid. Table below presents various features of both Grids and Clouds, stating the similarities and differences between both (cloud and Grid computing). The first one is Resource Sharing; Grids share

resources across the organization, whereas Clouds provide the resources on demand that the Service Provider requires. Another feature is Heterogeneity (dissimilarity), Cloud and Grid Computing support the aggregation Of heterogeneous (dissimilar) resources. Another feature is Virtualization feature that covers last two features also, data and computing resources. Both, Clouds and Grids deal in addition of the virtualization of hardware resources. As the Security feature is concerned, Grids does not deal with end user security, whereas in Clouds each user has an access to its individual virtualized environment. Moreover, still there are some of the valuable features (e.g. Scalability, Usability, and Payment Model Quality of Service).

TABLE 2 REFERENCES AS EXTRACTED FROM [6]

Feature	Grid	Cloud
Resource Sharing	Collaboration (VOs, fair share).	Assigned resources are not Shared.
Resource Heterogeneity	Aggregation of heterogeneous resources	Aggregation of heterogeneous resources.
Virtualization	Virtualization of data and computing resources.	Virtualization of hardware and software Platforms.
Security	Security through credential delegations	Security through isolation.
User Access	Access transparency for the end user.	Access transparency for the end user.
Usability	Hard to manage.	User friendliness

#### B).Security and Policy Issues in Cloud and Grid Computing:-



Cloud computing and grid computing technologies are used to gather and utilize computational capability. Clouds consist of data centres which are hired by the same institute. The similarity within each data centre is the main feature for the cloud computing as compared to grid computing. In this case, any issue between a heterogeneous data centre can become a serious issue for cloud's working. It can be seen that privacy provided by cloud to the external users will be less. On the other hand, grids was on the idea that resources infrastructure are dynamic and heterogeneous in their nature. This also means that security was taken into account when the grid system was originally introduced. Presently, the security paradigm for clouds appears to be less secure than grids system. The data in the cloud system is distributed over number of servers in the cluster and hosted by third parties those are hidden from the external users. This means the security of the users' data is less than expected. On the other side, grid environment is entirely different, where the grid administrators or grid users can handle their data and policies over their resources.

## CONCLUSION

In conclusion, cloud computing is a new technology of computer network, providing the high quality of web services and lower cost. Cloud computing might contribute in improvement of services in several other related technologies specially the previous generations such as Grid computing. Cloud computing can help companies to achieve efficient use of their IT hardware and software, which lead to the increase in inventions. Clouds consist of data centres which are owned by the homogeneous institute. The homogeneity within each data centre in the infrastructure is the main feature for the cloud computing as compared to grid computing. In this case, any conflict between a different data centre can become an issue for cloud working. It has been noticed that the privacy provided by cloud to the external users will be less than the desktop users in number of situations. Whereas, grids were established with the resources infrastructure are dynamic and

heterogeneous in the nature. Grid implies different organization with different administrative domains. It has been said that the cloud computing reduce the cost of the infrastructure by reducing the number of resources. Cloud Architectures shows flexibility in building applications on on-demand infrastructures. Google cloud is a good example for demonstrating this flexibility.

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