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Comparison of Cloud and Grid Computing

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Abstract— Cloud computing is a promising technology of the present and future which uses the grid computing as its backbone. Cloud computing is the hottest topic of information and communication technology (ICT) for implementing it for individual, communities and business. Grid computing is considered as most related predecessor technology of cloud computing. Although Cloud and Grid computing look similar but they differ at many aspects which has been explained in detail. The cloud computing and grid computing is compared side by side on the basis of features.

Keywords— Cloud computing, Grid computing, Infrastructure, Platform, Service

I. INTRODUCTION

Cloud computing and Grid computing are two main technologies which are in use in the world for easy and portable computing. Although look similar from layman point of view but they are quite different from each other. With Cloud computing application software can be operated using internet-enabled devices [4]. Grid computing is the collection of computer resources from multiple locations to reach a common goal. The grid can be imagined as a distributed system with non-interactive workloads that involve a large number of files.

II. CLOUD COMPUTING

Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction [1]. Resources are pooled and offered on-demand with ubiquitous network access to rapidly configurable and elastic IT capabilities. The three types of services provided by cloud are Software as service (SaaS), Platform as service (PaaS) and Infrastructure as service (IaaS). The deployment model, service models and service attributes are as given below:

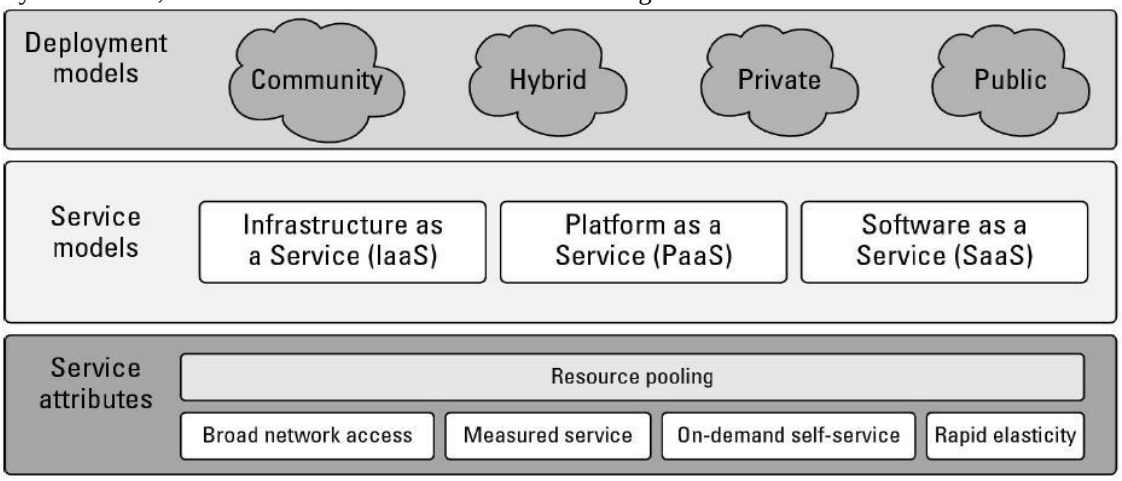

Figure 1: NIST Cloud computing [1]

The key benefits of providing computing power using Clouds are [5]:

i. Avoidance of expensive computer systems configured to cope with peak performance.
ii. Pay-per-use solutions for computing cycles requested on-demand.
iii. Avoidance of idle computing resources, resulting in novel business models.

III. GRID COMPUTING

Grid computing can be defined as sharing information and power, which gives us access to another type of heterogeneous resources which are geographically separated [2]. The grid is based on IPs (Internet protocols) and on the principle of parallel and distributed computing. The grid computing provides the sharing of computational resources, storage devices, applications, equipment etc. in an efficient way.

IV. DIFFERENCE IN ARCHITECTURE OF CLOUD AND GRID COMPUTING

When viewed in a broader sense both cloud and grid computing look like one and the same thing but if we study minutely then we can see the difference between them very clearly as explained below:

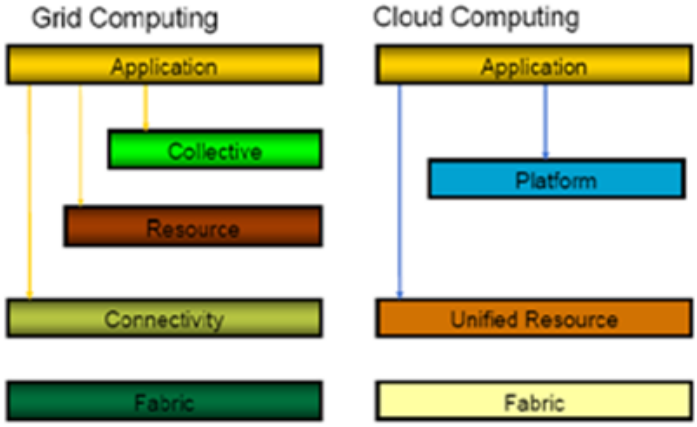

Figure 2: Grid computing and Cloud computing Architecture [2]

•**Business Models**: While in grid business models are usually based on bilateral agreements between academic institutions, provision of resource in clouds requires more differentiated business models. Currently, we observe several types of business models ranging from resource providers who only provide computing resources (e. g., Amazon), over SaaS providers who sell their own resources together with their own software services (e. g., GoogleApps, Salesforce.com) to companies that attempt to run a mixed approach, i. e., they allow users to create their own services but at the same time offer their own services (Sun N1 Grid, Microsoft Azure) [5].

•**Resource Management**: Resource management represents another major difference between grids and clouds. While grids rely on batch systems, utilization of virtualization technologies represents the resource management solution for the clouds.

•**Resource Provision Models**: Grid resource provisioning models are based on virtual organizations where the relationships are established offline. In clouds usage of SLAs, compliance, and trust management is essential.

•**Resource Availability**: In grids resource sharing relies on the best effort manner, sometimes resources are not available and sometimes there are plenty of resources which are idle. Clouds rely on massive elasticity in clouds. Challenging issues in clouds are to find the balance between wasting resources due to the virtualization overhead and standby modes of devices on the one hand, and pooling of resources to facilitate efficient consumption of resources and reducing energy consumption on the other.

Let us differentiate two technologies on basis of features side by side. The difference between cloud and grid computing is given below in tabular form [2] [3]:

TABLE 1 COMPARISON OF GRID AND CLOUD COMPUTING [2][3]

Feature	**Grid Computing**	**Cloud Computing**
Goal	Collaborative Sharing of resources	Use of service
Principal	Needs processing from you	Does the processing for you
Workflow management	In one physical node	In EC2 instance (Amazon EC2+S3)
Level of abstraction	Low	High
Degree of scalability	Normal	High
Transparency	Low	High
Time to run	Not real time	Real time services
Security	Low	High
Ownership	Multiple	Single
Resource sharing	Collaborative	Assigned resources are not shared
Uses	As computing/storage platform	Offer services
High level services	Plenty	Not defined yet
Standardization	Standardization and interoperability	Lack of standards for interoperability
Examples of real world	SETI,BOINC,GIMPS	Google apps, Amazon Web Services (AWS)
Type of service	CPU, network, memory, bandwidth, device, storage	IaaS, PaaS, SaaS everything as a service

Resource management	Distributed	Centralized/Distributed
Allocation/Scheduling	Decentralized	Both centralized/decentralized
Dependency	A grid is not necessarily a cloud or part of a cloud	A cloud would usually use a grid
Failure Management	Limited	Strong
Request type	Few but large allocation	Lots of small allocation
Operating System	Any standard OS	A hypervisor (VM) on which multiple OSs run
User friendly	Low	High
Number of users	Few	More
Response time	Can't be serviced at a time and need to be scheduled	Real Time
Pricing of Service	Dominated by public goods or privately assigned	Utility pricing, discounted for large customers
Data intensive storage	Suited for that	Not suited for that
Configuration	Difficult	Easy
Future	Cloud computing	Next generation of internet

V. CONCLUSIONS

In this paper the detailed comparison of two computing models grid computing and cloud computing has been presented. I think the close comparison like this help to understand the concept very easily and clearly. The cloud computing and grid computing are seen as two different names for the same technology which I tried to differentiate with the help of side by side comparison. Cloud and grid computing appears to be the promising model for future computing so there is great scope of future research in this area.

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