ORIENTAL JOURNAL OF
COMPUTER SCIENCE & TECHNOLOGY
An International Open Free Access, Peer Reviewed Research Journal
Published By: **Oriental Scientific Publishing Co., India.**
www.computerscijournal.org

ISSN: 0974-6471
June 2013,
Vol. 6, No. (2):
Pgs.141-145

Survey on Issues with the Architecture of Cloud and Grid

NIKHIL LAMBE[1] and RAJESH PRASAD[2]

[1,2]Department of Computer Engineering, ZES's Dyanganga College of
Engineering & Research, University of Pune, Pune, Maharashtra, (India).
Corresponding author E-mail :nikhil.lambe@zealeducation.com, rajesh.prasad@zealeducation.com

(Received: May 29, 2013; Accepted: June 07, 2013)

ABSTRACT

Cloud computing is not a new technology. Cloud computing is related to grid computing as well as it is based on distributed system. Cloud computing is used to provide services, access resources according to its different types. This paper explains in brief about the cloud computing and Grid computing as well as how both concepts differ from each other, its key strengths, and characteristics.

Key words : Cloud Computing, Grid Computing.

INTRODUCTION

Cloud Computing

Already defined cloud computing[1,6] by Foster, Zhao, Raicu, Lu is that "A large-scale distributed computing paradigm that is driven by economies of scale, in which a pool of abstracted, virtualized, dynamically-scalable, managed computing power, storage, platforms, and services are delivered on demand to external customers over the Internet[7]."One more definition of cloud computing is, A model for enabling environment, On-demand network access.e.g. if you want your own space, you can configure your own network or your own space 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 interactions well as services configured dynamically by using virtualization approach and delivered on demand basis[7].

Cloud computing is an umbrella standard pair and Grid is one component of cloud computing. Cloud computing is distributed computing paradigm in which software information is permanently stored in server on the Internet and cached temporarily on clients. All the growing Organizations, Institutes, Private as well as Government sectors, big companies are switch to Cloud Computing to resolve all their problems of computing and storage to improve the Organizations, Institutes overall growth, quality, and it directly affects on Turnover also.

Types of clouds

Clouds have different types that we can subscribe depending on our needs. An end user or personal user will most likely use public cloud services.

Public Cloud

A public cloud is available overall the internet and it can be accessed by any end user

with an internet connection and access to the cloud space. e. g. Amazon's EC2/3[10], Microsoft's Azure.

Private Cloud

A private cloud is designed for a particular institute or organization and it is accessible to that particular institute or organization. e.g. Amazon's Virtual private Cloud.

Community Cloud

A community cloud is shared among two or more institute or organizations that have similar requirements of cloud. e. g. Face book, LinkedIn.

Hybrid Cloud

A hybrid cloud is a mixed cloud of two or more types of clouds i. e. Public, Private, or Community. e. g. IT managed data center servers, knowledge servers organized in distributed organization.

Following Fig 1 shows different types of cloud computing in detail.

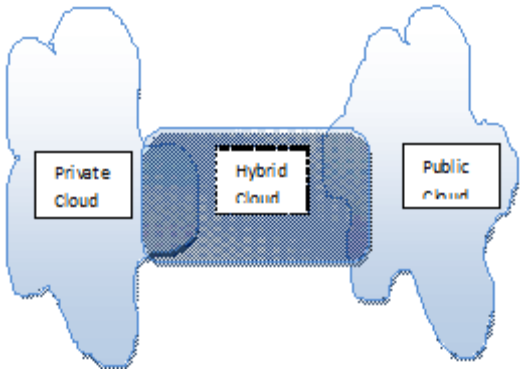

Fig.1: Types of Cloud.

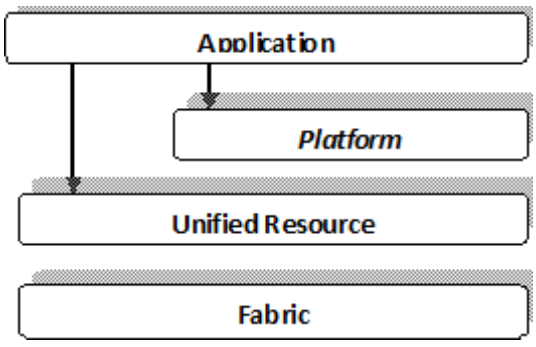

Fig. 2: Cloud Architecture

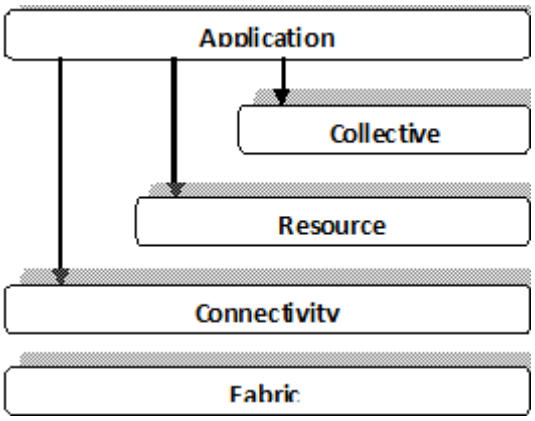

Fig. 3: Grid Architecture

Delivery Models of Cloud Computing

First The NIST defines mainly 3 delivery models of Cloud Computing they are as:

Software as a service (SaaS)

The end user uses an application, but does not any control or don't have any rights to alter the application, operating system, hardware, or network infrastructure on which its running[9]. e. g. Gmail, ymail.

Platform as a service (PaaS[8])

The end user uses hosting environment to their applications. the Platform is an application framework[8] e.g. Google API.

Infrastructure as a service (IaaS)

The end user uses Fundamental computing resources such as processing power storage, network components or middleware. The user can control the operating system storage deployed applications and possibly network components such as load balancers and Firewalls, but not cloud infrastructure beneath them. User is able to deploy and run arbitrary software, which can include operating systems and applications

Architecture

Cloud can be developed on the top of existing protocols like SOAP, WSDL and some advanced technologies such as AJAX, REST etc.There are many more Cloud architecture, but out of that according to my opinion the four-layer architecture of Cloud Computing is perfect as well as it is easy to comparison with Grid architecture. It

consist 4 layers they are as 1) fabric, 2) unified resource, 3) platform, and 4) application Layers.

The fabric layer is the first layer of cloud Architecture, It consist of the raw hardware level resources, e.g. compute resources, storage resources, and network resources. The unified resource layer is the second layer of cloud Architecture, It consists of the resources those are abstracted/encapsulated by using virtualization approach and they can be forwarded to upper layer or to the next layer. The platform layer is the third layer of cloud Architecture; It is used to provide a platform for deploying the applications by using its consisting specialized tools, services.

Finally, the application layer consists of the applications that would run in the Clouds.

Grid Computing

Grid computing is also an distributed computing paradigm. We add yet another definition to the already saturated list of definitions for Grid Computing[12,13] Co-ordinate resource sharing and problem solving in dynamic multiinstitutional Virtual organizations.

In above definition some key points are as, 1) Resources, It includes data, computers, and software etc.2) Virtual Organization, It makes Grid different from other distributed systems[11]. Virtual Organization consists of Individuals, associate resources and services united by a common purpose but spread across different administrative domains. Some elements of the problem of Grid computing are as follows :

Resource sharing

Resources being used are still owned by their respective organization and subject to its policies.

Coordination

Resource contributed to Virtual organization need to be coordinated by the Virtual organization in order to work together effectively.

Types of Grids

Grid have been divided into a number of types[13],on the basis of their use:Computational Grid: These grids is mostly used in computing high power servers. It is used provide secure access to huge pool of shared processing power suitable for high throughput applications and computation intensive computing.

Data Grid

Data grids is used to provide an infrastructure to support data discovery, data handling, data storage, and data manipulation of large volumes of data actually stored in various heterogeneous databases.

Collaboration Grid

Using the grid advanced collaboration is possible. The demand of collaboration is increased day by day in Internet. For instance, in a virtual enterprise Different persons from different organizations can work on different modules of same project without even disclosing their personal information.

Network Grid

In Network Grid Each grid node works as a data router between two communication points, for improving the speed of communications between such points, It provides data-caching and other facilities. A Network Grid is also used to provide fault-tolerant and high-performance communication services.

Utility Grid

Utility Grid is used to provide services like software's and special equipments. In this type of grid, the applications are execute on one machine and all other users send their data for processing to that respective machine and returns the result back. In this type of grid not only software's are shared for processing the data but also resources are shared for computation and results.

Architecture

Grids are used to address large-scale computation problems using a network. In grid computing paradigm resources are shared among the network for computing high performance. In Grid, Virtual Organizations plays very important role. It consists of Individuals, associate resources and services united by a common purpose but spread across different administrative domains to

execute and perform the task more effectively. Grids provide services and protocols at five different layers as defined in the Grid protocol architecture (refer Fig 3).

The fabric layer, this is the first layer of grid architecture In this Grids provide access to different resources e. g. storage and network resource, compute etc.

The connectivity layer is used for secure network transactions by communication and authentication protocols. The GSI (Grid Security Infrastructure)[1] protocol underlies every Grid transaction.

The resource layer is related to the resources that defines protocols for the negotiation, payment monitoring, of sharing operations on individual resources, accounting discovery, ,and publication. The protocol is used for allocation of computational resources is GRAM (Grid Resource Access and Management)[2].

The collective layer is used to collect all of resources, directory services e.g. MDS (Monitoring and Discovery Service)[3] i.e. helpful for monitoring and discovery of service resources.

The application layer defines user applications built on top of the above protocols and APIs and operate in VO environments.

CONCLUSION

From this paper we learnt the basics of issues related to cloud and grid architectures, computing, and delivery models.

The main difference deals with affordability in cloud and grid computing. Data fees for Cloud computing are incurred and it can be costly because it runs over a network. If the amount of resources required increases, the charges of network could become unpredictable. This issue is not experienced by Grid computing, because, in Grid computing, for sharing resources the systems do not have to depend on an Internet connection.

In addition, in Cloud computing the cloud service providers often have variable rates that depend on the amount of used resources. If an organization requires high processing, the fees for the cloud services and Internet connection can increase greatly. In this case, an organization might find that grid computing is a less-costly option.

Another concern is Security issue is between grid and cloud computing. Cloud computing uses stored data and resources on a network, so an organization can have major problems if there is an outage at the provider. The same issue occurs if a organization provides a particular service over the cloud, and it is interrupted for any reason.

As compare to Grid, cloud computing systems would reduce the need for expensive, new, advanced hardware at client side and it directly reduces the hardware costs.

REFERENCES

1. The Globus Security Team. "Globus Toolkit Version 4 Grid Security Infrastructure: A Standards Perspective," Technical Report, Argonne National Laboratory, MCS, (2005).
2. I. Foster, C. Kesselman. "Globus: A Meta computing Infrastructure Toolkit", *International Journal on Supercomputer Applications,* **11(2)**:115-128, (1997).
3. J. M. Schopf, I. Raicu, L. Pearlman, N. Miller, C. Kesselman, I. Foster, M. D'Arcy. "Monitoring and Discovery in a Web Services Framework: Functionality and Performance of Globus Toolkit MDS4", Technical Report, Argonne National Laboratory, MCS Preprint #ANL/MCS-P1315-0106, (2006).
4. J. Silvestre. "Economies and Diseconomies of Scale," The New Palgrave: *A Dictionary of Economics,* **2**, pp. 80-84, (1987).
5. Cloud computing and grid computing 360-

degree compared I Foster, Y Zhao, I Raicu, S Lu - Grid Computing Environments …, ieeexplore.ieee.org (2008).

6. A break in the clouds: towards a cloud definition LM Vaquero, L Rodero-Merino, J Caceres… - ACM SIGCOMM, dl.acm.org (2008).
7. "What is Cloud Computing?", Whatis.com. http://searchsoa.techtarget.com/sDefinition/0,,sid26_gci1287881,00.html, (2008).
8. Amazon Elastic Compute Cloud (Amazon EC2), http://aws.amazon.com/ec2, (2008).
9. I. Foster, C. Kesselman, S. Tuecke. The anatomy of the Grid: Enabling scalable virtual organization. *The International journal of High Performance Computing Applications,* 15(3):200--222, (2001).
10. I. Foster, C. Kesselman, J. Nick, S. Tuecke, "The Physiology of the Grid: An Open Grid Services Architecture for Distributed Systems Integration", Globus Project, (2002).
11. Free space computation using stochastic occupancy grids and dynamic programming H Badino, U Franke, R Mester - Workshop on Dynamical, - vsi.cs.uni-frankfurt.de (2007).
12. A.M. Cohen, "Types of Clouds - The Futurist", minnesotafuturists.pbworks.com (2009).