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GRID COMPUTING, CLOUD COMPUTING AND MOBILE COMPUTING

Jay Dubbewar[1], Gajendra Chaudhary[2], Onkar Jadhav[3], Prof.Sonal V. Sawarkar[4]

[1]*BE Student, Information Technology, JDIET,Maharashtra,India,* ***jaydubbewar122@gmail.com***
[2] *BE Student,Information Technology,JDIET,Maharashtra,India,* ***gajendrachaudhary9325@gmail.com***
[3]*BE Student, Information Technology,JDIET,Maharashtra,India,* ***onkarjadhav7218@rediffmail.com***
[4]*Professor,Computer Science & Engineering Dept.,JDIET,Maharashtra,India,****sonal.channe@gmail.com***

Abstract

Grid computing is a promising technology.This technology provides enormous processing power,memory and storge capacity to every simple computer on the grid. Grid computing is the collection of computer resources from multiple location to reach a common goal. It also works as a backbone technology for cloud computing. Looking towards the needs for data storage of today's world,cloud computing has a great importance in IT industry.IT industry needs to think it over a massive area of operation and usage Mobile cloud computing (Mcc) is evolving as one of the most important branches of cloud computing .The growth population of mobile devices such as smart phones and tablets provides huge amount of idling computing power(eg. Smartphones and tablets).The result show that a cloud computing system with enough mobile devices working co-operatively is able to save 55% to 99%. The term cloud appears to have it's origine in the network diagrams that represented the internet.A common understanding of " cloud computing" is continuously involving. The pirimiry business services models being deployed(such as software,platform and infrastructure as the services) and common deployment models employ by service providers and users to use and maintain the cloud services(such as private,public,community, and hybrid clouds) are dicussed. We are probably using cloud computing right now,but we don't realize it.For example if we are using online services to sent email,watch T.V.,movies,listening music or storing pictures, it is like that cloud computing is making this possible behind the secnes.The first cloud computing services are barely a decade old,but already a verity of orginations from tiny start ups to global coorpations,government agencies to non profits are using the technology for all sorts of reasons.

Index Terms: *Grid Computing1,Mobile Computing2,Cloud Computing3,Software Platform4*

1.GRID COMPUTING

1.1 Introduction

Various architectural enhancements exist for increasing computer as well as network speed sand storage capacity. How effectively is the resulting computing power utilized? Surprisingly low utilization? Mainframes are un-used 40% of the time. UNIX® Servers "serve" less than 10% of the time! Desktops produce "useful work" less than 5% of the time!

We have fast computers and fast means to connect them Simply stated Distributed computing taken to next level.

"*The goal is to create the illusion of a simplest yet large and powerful self managing virtual computer out of a large collection of connected heterogeneous systems sharing various combination of resources".*

1.2 What Grid Can Do…

a. Exploiting underutilized resources
b. Parallel CPU capacity
c. Virtual resources and virtual
d. Access to additional resources
e. Resource balancing
f. Reliability and Management

1.3 Grid Computing compared to..

a. Distributed Computing
   Homogeneous vs. heterogeneous
b. Cluster Computing
   Centralized control vs. distributed control
c. Peer To Peer (P2P)
   Merging streams

1.4 Architectural Considerations

a. CPU Considerations

Parallelizable?
Parameter space problem?

b. Data considerations

Amount of data and time to send it.

1.5 Is this for Real?

a. Very Much!!

Real Grids

NASA IPG, the World Wide Grid, and the NSF Tera Grid

b. An intragrid example: developed at University of Wisconsin and available at UMD

2.CLOUD COMPUTING

2.1 Introduction

Providing software as a service is not a new computing practice. Some companies, known as Application Service Providers (ASPs), were providing businesses with software programs as a service via the medium of the Internet during the 1990s.

However, such attempts at "utility computing" did not take off. This was largely attributed to lack of sufficient bandwidth.

However, Web services are nowhere near achieving the full potential that was hoped for. Nevertheless the technologies being implemented successfully (and commercially) by many of the big players such as eBay, Amazon and Google. Furthermore, the technology has also created the foundation for a new Enterprise Application Integration (EAI) paradigm known as Service-Oriented Architecture (SOA).

2.2 WHAT IS CLOUD COMPUTING?

Cloud computing is a used to describe a variety of computing concepts that involve a large number of computers connected through a communication network such as the Internet [1]. It is very similar to the concept of utility computing. In sciencecloud computing is a synonym for distributed computing over a network, and means the ability to run a program or application on many connected computers at the same time.

Cloud computing providers offer their services according to several fundamental models. The following is a list of the three main types of services that can be offered by the cloud:-

a. *Infrastructure as a Service (IaaS):* Products offered via this mode include the remote delivery (through the Internet) of a full computer infrastructure (e.g., virtual computers, servers, storage devices, etc.).

b. *Platform as a Service (PaaS):* To understand this cloud computing layer one needs to remember the traditional computing model where each application managed locally required hardware, an operating system, a database, middleware, Web servers, and other software. One also needs to remember the team of network, database, and system management experts that are needed to keep everything up and running. With cloud computing, these services are now prov• *Software as a Service (SaaS):* Under this layer, applications are delivered through the medium of the Internet as a service. stead of installing and maintaining software, you simply access it via the Internet, freeing yourself from complex software and hardware management. This type of cloud service offers a complete application functionality that ranges from productivity (e.g., office-type) applications to programs such as those for Customer Relationship Management (CRM) or enterprise-resource management.

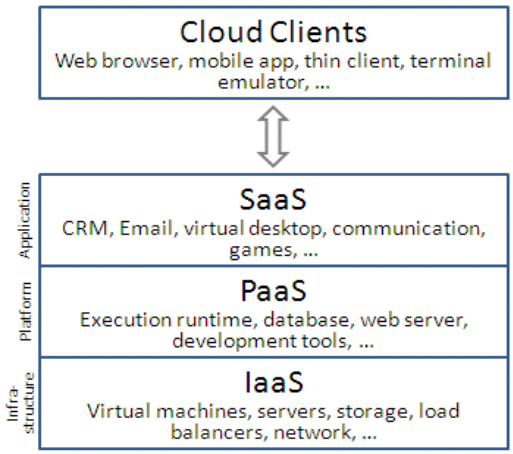

Fig.1. Structure of Cloud and its Services on the Cloud Platform

Before proceeding any further at this stage, a word of caution is necessary. One must not assume that cloud products offered by any of the above services are likely to work out-of-the-box. In some cases they might. Google Apps, a messaging and collaboration cloud platform from Google, is probably one good example of those out-of-the-box products (even though it does require some level of configuration nevertheless). Many of the products that are offered by those three types of cloud services will require some degree of programe (by user or indeed the cloud provider) in order to access the functionality that exists in those services. Cloud providers will have created their own APIs (application programming interfaces) so that software developers can use them to create client applications in order to access that functionality. Currently, some of those APIs are proprietary; an issue which will be revisited later when examining some of the limitations of cloud computing. However, some are based on open source standards such as SOAP or REST.

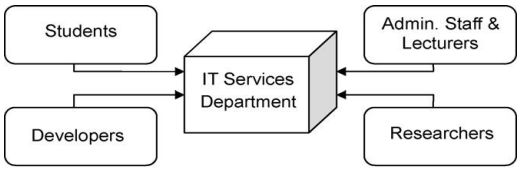

Fig.2. Simplified structure of the main users of IT services in a typical university

2.3 CLOUD CLIENTS

Users access cloud computing using networked client devices, such as desktop computers, laptops, tablet sand smart phones. Some of these devices – cloud clients – rely on cloud computing for all or a majority of their applications so as to be essentially useless

without it. Examples are thin clients and the browser-based Chrome book. Many cloud applications do not require specific software on the client and instead use a web browser to interact with the cloud application.

3.MOBILE CLOUD COMPUTING

3.1 Introduction

Mobile devices face many resource challenges(battery life, storage, bandwidth etc.)

Cloud computing offers advantages to users by allowing them to use infrastructure, platforms and software by cloud providers at low co stand elastically in an on-demand fashion.

Mobile cloud computing provides mobile users with data storage and processing services in clouds, obviating the need to have a powerful device configuration (e.g. CPU speed, memory capacity etc), as all resource-intensive computing can be performed in the cloud.

3.2 MCC Popularity

According to a recent study by ABI Research, more than 240 million business will use cloud services through mobile devices by 2015.

That traction will push the revenue of mobile cloud computing to $5.2 billion.

Mobile cloud computing is a highly promising trend for the future of mobile computing.

4. ADVANTAGES OF MCC,GRID,CLOUD COMPUTING

Extending battery lifetime:

Computation offloading migrates large computations and complex processing from resource-limited devices (i.e., mobile devices, computers) to resourceful machines (i.e., servers in clouds).

Remote application execution can save energy significantly.

Many mobile and computer applications take advantages from migration and remote processing.

5. APPLICATIONS OF MOBILE,GRID & CLOUD COMPUTING

M-learning combines e-learning and mobility.

Traditional m-learning has limitations on high cost of devices/network, low transmission rate, limited educational resources.

Cloud-based m-learning can solve these limitations.

Enhanced communication quality between students and teachers.

Help learners access remote learning resources.

A natural environment for collaborative learning.

6.SECURITY ISSUES

Protecting user privacy and data/application secrecy from adversaries is key to establish and maintain consumers' trust in the mobile platform, especially in MCC.

MCC security issues have two main categories:

a. Security for users
b. Securing data on clouds

6.1 Security For Users

Mobile devices are exposed to numerous security threats like malicious codes and their vulnerability.

GPS can cause privacy issues for subscribers.

Security for mobile applications:

a. Installing and running security software are the simplest ways.

6.2 Securing Data On Clouds

a. Hardening of the servers to protect against known, and unknown, vulnerabilities in the operating system and software
b. Physical security to protect against unauthorized physical access to data

7.CONCLUSION

In this paper, we have presented a detailed comparison on the two computing models, grid and cloud computing. 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. When it comes to grid and cloud computing, the two are often seen as the same computing paradigm under different names. In this paper, we sought to separate grids from clouds and provide a side by side comparison in how they are assembled and what services are offered. In a word, the concept of cloud computing is becoming more and more popular.

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