CLOUD COMPUTING TRANSFORMING INFORMATION TECHNOLOGY

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Abstract: **This paper describes cloud computing, a computing platform for the next generation of the Internet. With cloud computing gaining increasing acceptance among enterprise, the IT landscape is witnessing a paradigm shift. The paper defines clouds, explains the business benefits of cloud computing, and outlines cloud architecture. By the help of Cloud computing a business can use cloud computing to foster innovation and reduce cost. Cloud is characterized by features such as platform, location and device independency, which make it easily adoptable for all sizes of businesses, in particular small and mid-sized. Cloud computing is cost-effective and recurring expenses are much lower than traditional computing. Redundancy of computer system networks and storage system cloud may not be reliable for data, but it scores well as far as security. Roughly, it describes highly scalable computing resources provided as an external service via the internet on a pay-as-you-go basis.**

The cloud is simply a metaphor for the internet, based on the symbol used to represent the worldwide network in computer network diagrams. Economically, the main appeal of cloud computing is that customers only use what they need, and only pay for what they actually use.

Keywords: *Internet Computing, Cloud computing, private cloud, cloud, SaaS, PaaS, IaaS*

I. INTRODUCTION

"Cloud Computing," to put it simply, means "Internet Computing." The Internet is commonly visualized as clouds; hence the term "cloud computing" for computation done through the Internet. With Cloud Computing users can access database resources via the Internet from anywhere, for as long as they need, without worrying about any maintenance or management of actual resources. Besides, databases in cloud are very dynamic and scalable.

Cloud computing is unlike grid computing, utility computing, or autonomic computing. In fact, it is a very independent platform in terms of computing. The best example of cloud computing is Google Apps where any application can be accessed using a browser and it can be deployed on thousands of computer through the Internet.

Cloud computing delivers IT as a service might be own private cloud accessible only within organization, the public cloud of an external provider, or a hybrid cloud that spans both. Cloud computing refers to the use and access of multiple server-based computational resources via a digital network (WAN, Internet connection using the World Wide Web, etc.). Cloud users may access the server resources using a computer, notebook, pad computer, smart phone, or other device. In cloud computing, applications are provided and managed by the cloud server and data is also stored remotely in the cloud configuration. Users do not download and install applications on their own device or computer; all processing and storage is maintained by the cloud server. The online services may be offered from a cloud provider or by a private organization.

Dell has developed a growing portfolio of efficient cloud computing solutions to help you achieve that flexible infrastructure.

Some of basic features of a cloud that are given below:

- Virtually unlimited processing and storage capacity
- Abstracted, pooled resources
- Elasticity (the ability to scale up or down easily)
- On-demand, self-service provisioning
- High level of automation
- Consumption-based billing

II. CLOUD SERVICE MODELS

There are three cloud service models:

- *Software as a service (SaaS):*cloud computing allows a company to pay for only as much capacity as is needed, and bring more online as soon as required. Because this pay-for-what-we-use model resembles the way electricity, fuel and water are consumed it's sometimes referred to as utility computing also gives users Web access to applications hosted on a service provider's infrastructure. A wide range of applications can be delivered through a SaaS model, such as customer relationship management, collaboration, email and enterprise resource management.

- *Platform as a service (PaaS):*Platform-as-a-service in the cloud is defined as a set of

software and product development tools hosted on the provider's infrastructure. Developers create applications on the provider's platform over the Internet. PaaS providers may use APIs, website portals or gateway software installed on the customer's computer. For Example Force.com, (an outgrowth of Salesforce.com) and Google Apps are examples of PaaS. Developers need to know that currently, there are not standards for interoperability or data portability in the cloud. Some providers will not allow software created by their customers to be moved off the provider's platform.

- *Infrastructure as a service (IaaS):* In the Infrastructure-as-a-service cloud model, the vendor supplies the hardware infrastructure, the software product and interacts with the user through a front-end portal. SaaS is a very broad market. Services can be anything from Web-based email to inventory control and database processing. Because the service provider hosts both the application and the data, the end user is free to use the service from anywhere.
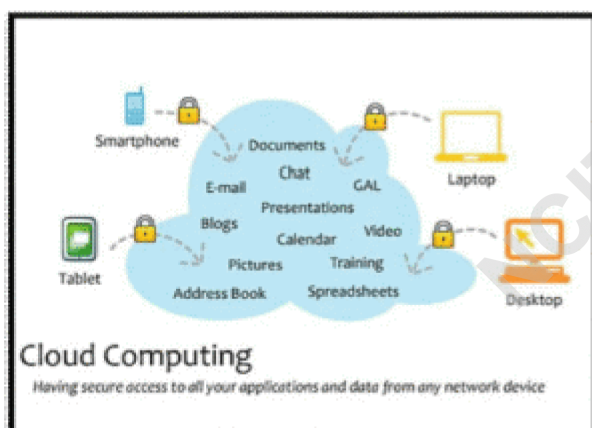

Fig 1 . Infrastructure Service Cloud Model

III. CLOUD STRUCTURES

There are three primary deployment models for cloud services:

- *Private clouds*, whether operated and hosted by enterprise IT department or by an external provider, are for the exclusive use of the organization.

- *Public clouds* are open to any number of organizations and individual users on a shared basis. Using a public cloud minimizes initial capital investment and combines agility and efficiency with massive scalability.

- *Hybrid clouds* link private and public clouds, providing access to extra resources when the private cloud hits maximum utilization. Or, a hybrid cloud might split computing by tier between private and public clouds. For example, the database may reside in the private cloud while the application server is located in the public cloud.

With any of these structures, cloud computing enables an application to take advantage of idle or excess compute, storage and network capacity that is shared with other applications. The cloud is one of the keys to avoiding over provisioning and enabling efficient load balancing among your computing resources.

IV. DIFFERENT TYPES OF APPLICATIONS OF CLOUD COMPUTING

1) Mint (The Best Free Cloud Application to Manage Money in the Cloud)

A Cloud based personal finance tool to manage money. Launched in September 2007, in just 2+ years of existence it has received 30+ prestigious web awards from the likes of CNN Money, Time, Business Week, PC Mag etc. Just create an account and access all your balances and transactions together on the web or on your iPhone. It's a simple but innovative concept: All your money related accounts viz. bank accounts, credit card, loans, stock brokerage and other investments in one place.
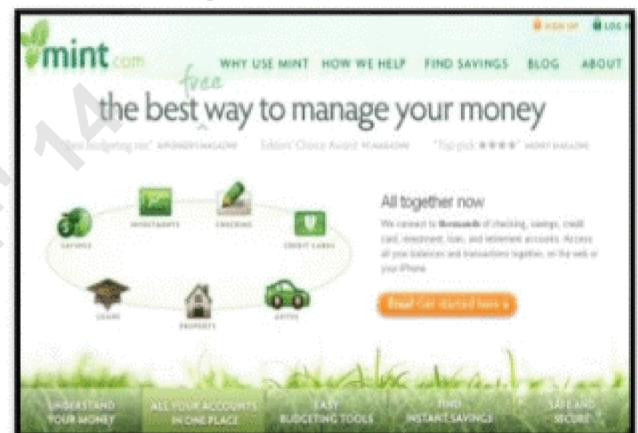

Fig 2. Mint - Manage Money in the Cloud

India based banks are not supported by Mint. Interestingly, the FAQ page at Mint explicitly mentions that currently it supports only US-based financial institutions. Mint provides bank level data security and industry leading identity protection. Its security and privacy have been validated by VeriSign and TRUST. We have to register anonymously using any valid email address, and then add the log–in information for the online bank, credit union, credit card and investment accounts you want to consolidate in Mint

2) Cloud based Desktop

Access, upload and share your files from anywhere, even your phone, truly represents what it does. Online storage, Photos, Music, Movies, Application development, Calendar, Mail, Media Player, Word Processors etc. It has both free and premium signup. It also offers a platform for web developers (Platform as a service, **PaaS**). The free account provides 3GB of Cloud Me drive storage. Here we can view the wallpaper, desktop icons, Programs (like All Programs of any Windows OS), the user name (and his photograph), Start Menu, Taskbar etc.

3) Cloudo

A free computer that lives on the Internet, right in your web browser. This means that you can access your documents, photos, music, movies and all other files no matter where you are, from any computer or mobile phone. Cloudo is a hosted service, there is no hardware or software to setup and maintain, and the DDE is fully accessible from any internet connected device. Other advantages of utilizing hosted software include centralizing data backup, updates, and security at the data center as well as the benefits of lower cost which can be associated with the administration of a single global instance of software versus many local instances. Here, I have created the following screen shot after opening the Word program. You can also see the attractive media player(right hand bottom), desktop icons, wallpaper etc.

Figure 3:View of Cludo

4) eyeOS

It describes itself as the Open Source Cloud's Web Desktop similar to the iCloud & Cloudo . It has a very attractive design, we have to Create an Account at eyeOS to get started with this free Cloud Desktop.

Figure 4: View of eyeOS

5) Panda Cloud Antivirus (The Best Free Cloud based Antivirus)
The first free antivirus from the cloud. It has received many decent reviews. PC Magazine stamped its renowned
Editor's Choice on Panda Cloud AV for **Best Free AV**.
- No need to worry about regular updates.

- Occupies very little system resources.
- Uses collective intelligence servers for fast detection
- Simple interface.

Also protects our PC while offline (not connected to internet) as it uses a local cache of signatures from Collective Intelligence. But please note that the local cache does not maintain a signature of virus/malware which it deems dead or not in circulation.

This data memo takes a snapshot at the prevalence of the use of online services to store personal information or access software. Survey asked about six different online behaviors that would qualify as using cloud computing resources. This is not intended to be a comprehensive portrait of cloud usage, but rather – for a select set of activities – an overview of how many internet users let the network be the steward of data and applications that have typically been on the personal computer.

Cloud Computing Activities (% in each group who do the following activities)		
	All internet users	*Those who use a laptop to connect with Wifi away from home or work*
Use webmail services such as Hotmail, Gmail, or Yahoo! mail	56%	64%
Store personal photos online	34	44
Use online applications such as Google Documents or Adobe Photoshop Express	29	38
Store personal videos online	07	13
Pay to store computer files online	05	10
Back up hard drive to an online site	5	9

Source: Pew Internet & American Life Project April-May 2008 Survey. N=1,553 Internet users. Margin of error is ±3%.

Table 1. Cloud Computing Activities

Younger internet users are more inclined than older ones to use services or applications that require personal data be stored online.

They use the different services that store personal information on the web, users cite a range of reasons that have mostly to do with ease and flexibility. They like how such services enable them to share data with others and let them easily access their data from any computer.

Cloud Computing Activities by Different Age Cohorts

Internet users in each age group who do the following online activities (%)

	18-29	30-49	50-64	65+
Use webmail services as Hotmail,Gmail, Yahoo! mail	77	58	44	27
Store personal photos	50	34	26	19
Online applications as Google Doc. or Adobe Photoshop	39	28	25	19
Store personal videos	14	06	05	02
Pay to store computer files online	9	4	5	3
Back up hard drive to an online site	7	5	5	4
Have done at least one activity	87	71	59	46
Have done at least two activities	59	39	31	21

Source: Pew Internet & American Life Project April-May 2008 Survey. N=1,553 Internet users. Margin of error is ±3%.

Table 2. Cloud Computing Activities by different age cohorts

The ease and flexibility of cloud applications draw users to them. When asked why Roughly half (51%) of those who have done at least one of the listed cloud applications say that ease and convenience are a major reason why they use an application that has them storing personal data on the web. Some 41% say a major reason they use such applications is that they want to access information no matter what computer they are using.

Why people use "cloud" applications
% of those who use online applications and services to store data

	Major reason	Minor reason	Not a reason at all	Don't Knew/ refused
It is just easy &convenient.	51%	23%	23%	3%
I can access information from computer I am using.	41	25	32	2
I can easily share info. with others.	39	28	29	2
I won't lose information if my Computer fails.	34	23	23	3

Source: Pew Internet & American Life Project April-May 2008 Survey. N=999 for those who have used online applications and services to store data. Margin of error is ±3.5%.

Table 3. Cloud Computing Applications

Younger users of cloud applications are more likely to herald the benefits of storing information or accessing software applications online.

Younger users particularly appreciate the benefits of the "cloud"
% of those using online applications and services to store data who cite "major reason" for using them

	18-29	30-39	50-64	65+
It is just easy and convenient.	56%	52%	50%	37%
I can access this information from Whatever computer I am using.	51	42	34	19
I can easily share information with others.	45	38	39	27
I won't lose this information if my Computer fails.	35	35	34	18

Source: Pew Internet & American Life Project April-May 2008 Survey. N=999 for those who have used online applications and services to store data. Margin of error is ±3.5%.

Table 3. Younger user Details

V. CLOUD COMPUTING ARCHITECTURE

Cloud architecture the systems architecture of the software systems involved in the delivery of cloud computing, typically involves multiple cloud components communicating with each other over loose coupling mechanism such as messaging queue. The two most significant components of cloud computing architecture are known as the front end and the back end. The front end is the part seen by the client, i.e., the computer user. This includes the client's network (or computer) and the applications used to access the cloud via a user interface such as a web browser. The back end of the cloud computing architecture is the cloud itself, comprising various computers, servers and data storage devices.

A. Front end

The front end of the cloud computing system comprises the client's device (or it may be computer network) and some applications are needed for accessing the cloud computing system. All the cloud computing systems do not give the same interface to users. Web services like electronic mail programs control some existing web browsers such as Firefox, Microsoft's internet explorer or safari. Other type of systems has some unique application which provides the network access to its clients. Front end is a technical term which refers to the interface though which a user can use some kind of services, so don't get confused with this term.

B. Back end

Back end refers to the some physical peripherals. In cloud computing back end is cloud itself which may encompasses of various computer machines, data storage systems, servers. Group of these clouds make a whole cloud

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computing system. Theoretically, any cloud computing system can include practically any type of computer machine program that can be imagined by a human being such as from video games to data processing, software development to entertainment. Usually, every application would have its individual dedicated server for services. A central server is established which is used for administering the whole system. It is also used for monitoring client's demand as well as traffic to ensure that everything of system runs without any problem. Virtualization is the key element in any form of application or resource brokering. To understand the process from the virtual desktop perspective:

1. The user requests an application resource in a symbolic form (via URL or a Web service UDDI).

2. The cloud computing environment fields the request and assigns resources to the task.

3. Resources are loaded with the required software.
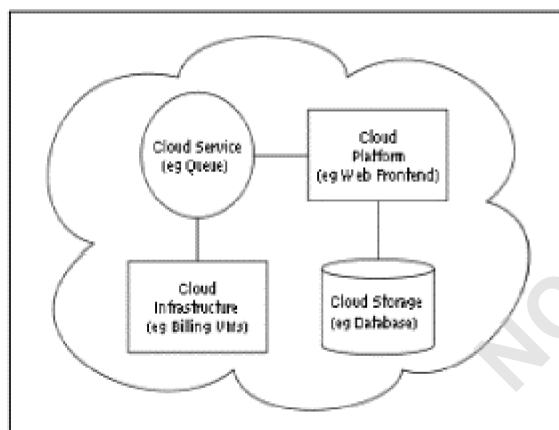
4. The address of the resources is returned

Fig 5.General Overview of Cloud Computing

VI. CONCLUSION

Cloud computing represents an exciting opportunity to bring on-demand applications to customers in an environment of reduced risk and enhanced reliability. However, it is important to understand that existing applications cannot just be unleashed on the cloud as is. Careful attention to design will help ensure a successful deployment. In particular, cloud-based applications should be deployed as virtual appliances so they contain all the components needed to operate, update and manage them. Simple design will aid with scalability as demand for the application increases and planning for failure will ensure that the worst doesn't happen when the inevitable occurs.

ACKNOWLEDGMENT

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