

Investigation on the issues of Security and Privacy on Cloud Computing

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Abstract: The main objective of this document is to emphasize the idea of Cloud Computing and its advancements. There are more offerings, more in-house development of CLOUDs and more experience in how best to use the technology. Developments have closed some gaps identified in the past but more gaps have opened. This report considers the current, fast-moving, situation and identifies research topics which – if supported – could provide us with the know-how to be world-leading in CLOUD Computing.

Introduction:

The term ‘Cloud’ represents ‘Internet’. The cloud symbol is used in the telecom world to distinguish between the responsibilities of the provider to that of the user. Cloud computing allows users in an organization to access shared resources, applications, servers, computers, etc over the internet on demand from a service provider. The provider can calculate the time bound resource utilization as per the service level agreement and bill the organization based on the usage. This is just like using the electricity from your provider and paying the electric bill based on the usage as captured by the meter.

Cloud Computing: New Paradigms:

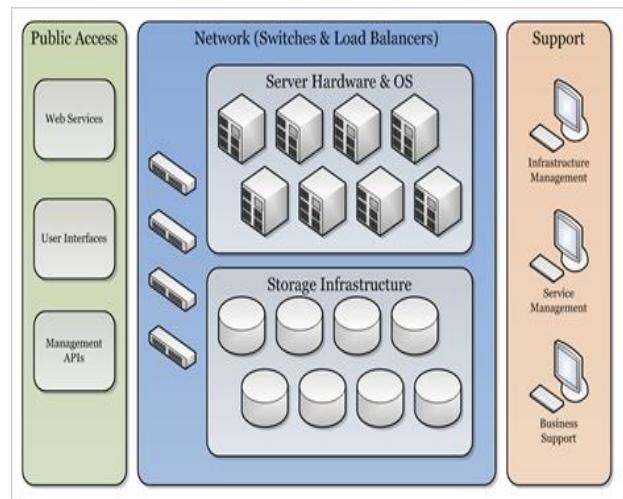
Cloud computing is an Internet-based distributed system architecture. Whatever the user needs and wherever he demands it—Cloud can deliver it. Services are furnished by software whereas resources are a complex of virtualized computing facilities, storages, and networking hardware provided by the Cloud

for end users and enterprises. Therefore, the Cloud computing principle leads to a new paradigm in computer architecture.

We can divide the whole system into two parts:

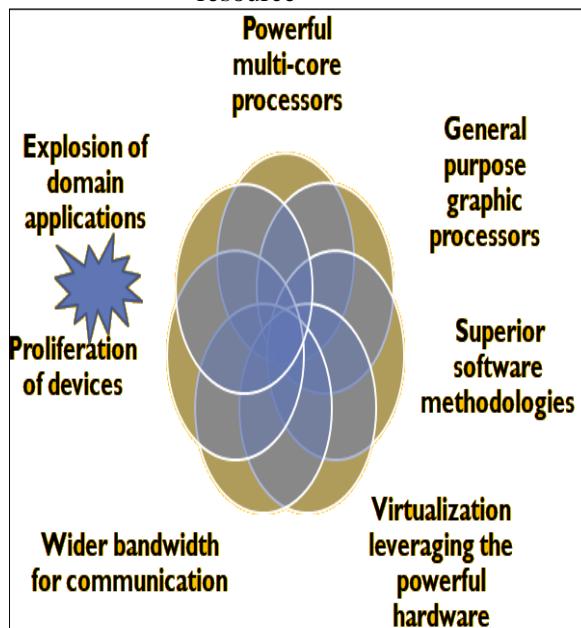
- The front-end which consist of different kind of mobile devices like tablets, smart phones, PCs, or simply embedded systems, and regarding software.
- The back-end, which is the Cloud infrastructure consisting of resources and services (as public, private, hybrid, or federated Cloud) with a centralized view for users.

The front-end and back-end are connected to each other through a broadband network, usually the Internet. The front-end is what the computer user, or customer, sees. The back-end works in the background to satisfy user demand.



Features:

1. Cloud computing technology provides a more flexible and agile infrastructure at a low cost. It is important considering the fact that organizations have to often deal with business re-org, market fluctuations, resource resizing etc.
2. Companies can significantly reduce their capital expenditure on IT by adapting to the cloud computing model.
3. Users can access the systems from anywhere in the world via internet regardless of where the infrastructure is located (third party service provider).
4. Different companies can share the resources under a single cloud from a third party service provider. The benefit of doing so is as follows:
 - a. Huge computing resource pool and a greater network bandwidth will increase peak load capacity.
 - b. Using virtualization technology for setting up the cloud infrastructure will allow new host systems to be added or the existing systems to be upgraded with additional computing resource



Three levels in cloud computing:

Cloud computing services are categorized into three different levels:

Software as a Service (SaaS):

These types of application are generally designed for end-users, delivered over the web. SaaS works so much better for students because it provides access to applications anytime, anywhere. Adding more users or scaling the software to more classrooms or campuses is becomes very easy task with SaaS.

Platform as a Service (PaaS):

PaaS is the collection of development tools and services which is used for coding and deploying the applications quick and efficient.

With PaaS, we can develop new applications or services in the cloud which is platform independent, and also make them widely available to users through the Internet.

Infrastructure as a Service (IaaS):

IaaS is the combination of hardware and software that powers it all – servers, storage, networks, operating systems. These are also known as On demand data centers which provide compute power, memory, and storage, typically priced per hour according to resource consumption. It can be used to satisfy the infrastructure needs of students, staff or any other academia's.

Types Of Cloud:

Cloud computing comes in three forms: public clouds, private clouds, and hybrids clouds. **Public Clouds**

A public cloud is basically the internet. Service providers use the internet to make resources, such as applications (also known as Software-as-a-service) and storage, available to the general public, or on a 'public cloud. Examples of public clouds include Amazon Elastic Compute Cloud (EC2), IBM's Blue Cloud, Sun Cloud, Google AppEngine and Windows Azure Services Platform.

For users, these types of clouds will provide the best economies of scale, are inexpensive to set-up because hardware, application and bandwidth costs are covered by the provider. It's a pay-per-usage model and the only costs incurred are based on the capacity that is used.

There are some limitations, however; the public cloud may not be the right fit for every organization. The model can limit configuration, security, and SLA specificity, making it less-than-ideal for services using sensitive data that is subject to compliancy regulations.

Private Clouds

Private clouds are data center architectures owned by a single company that provides flexibility, scalability, provisioning, automation and monitoring. The goal of a private cloud is not sell "as-a-service" offerings to external customers but instead to gain the benefits of cloud architecture without giving up the control of maintaining your own data center.

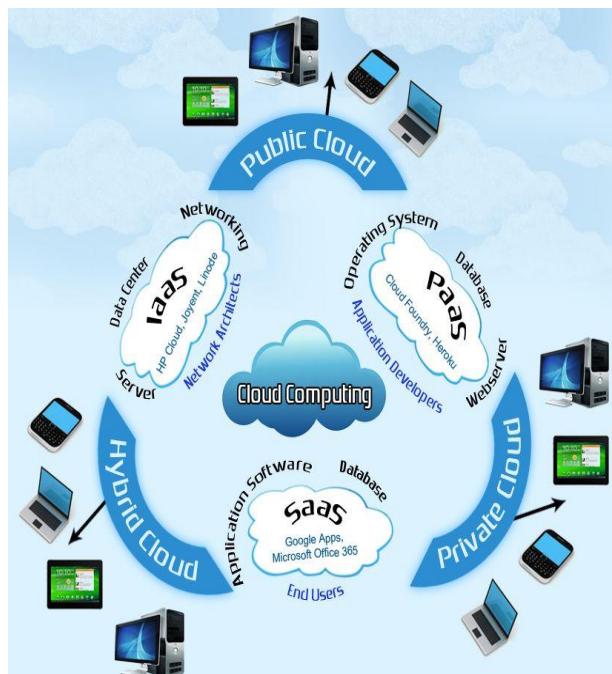
Private clouds can be expensive with typically modest economies of scale. This is usually not an option for the average Small-to-Medium sized business and is most typically put to use by large enterprises. Private clouds are driven by concerns around

security and compliance, and keeping assets within the firewall.

Hybrid Clouds

By using a Hybrid approach, companies can maintain control of an internally managed private cloud while relying on the public cloud as needed. For instance during peak periods individual applications, or portions of applications can be migrated to the Public Cloud. This will also be beneficial during predictable outages: hurricane warnings, scheduled maintenance windows, rolling brown/blackouts.

The ability to maintain an off-premise disaster recovery site for most organizations is impossible due to cost. While there are lower cost solutions and alternatives the lower down the spectrum an organization gets, the capability to recover data quickly reduces. Cloud based Disaster Recovery (DR)/Business Continuity (BC) services allow organizations to contract failover out to a Managed Services Provider that maintains multi-tenant infrastructure for DR/BC, and specializes in getting business back online quickly.



Advances in Education:

Current scenario:

Education system is always based on the marks, grades and figures. But in real life the practical knowledge and some practice is required. For this reason Institutes have to build latest configured Laboratory which incur highest cost in hardware configuration.

Hence there is need to find out feasible solution and the solution is Cloud Computing services.

To overcome from such type of problem the Institute can subscribe a service from any cloud service provider on the bases of pay as you go. Another factor is that Institutes are heavily depend upon content management system according to that Institute can also hire a service to store the content on the cloud and any student or staff or any academia's can use that from anywhere and anytime and on any device.

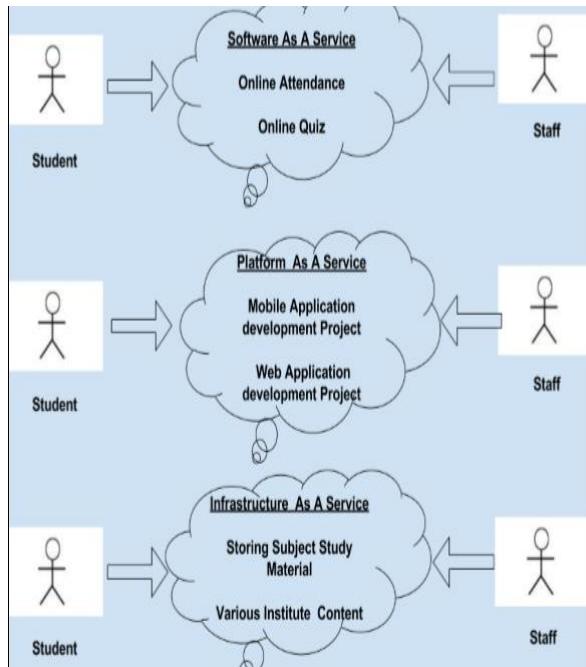
Implementation of cloud computing in education sector:

The potential users of Education cloud are students, staff or academicians. Each user has their own credentials to access the respective cloud services.

Adopting SAAS of Education cloud, teaching staff can maintain the attendance, conduct online quiz and many more with the respective software packages .

Adopting PAAS Institute can organize practical sessions as and when needed from Education Cloud. For e.g., developing projects like mobile apps, web apps, etc.

Adopting IAAS Staff can upload their study materials or any related content on Education cloud and student can access these materials and content 24*7*365



Mobiles:

Regarding recent advances in mobile communication technologies, a new wave of user demands for rich mobile service experience has been fueled. Mobile users always expect broadband Internet access wherever they go, interact with each other via social networks while moving; furthermore, they are seeking ubiquitous access to a wealth of media-based contents and services. Because mobile devices are resource limited inherently, it is essential for the cloud to provide computational support for many media-rich applications.

The combination of mobile media and cloud computing highly arises many technical challenges, and the fundamental tension between resource-hungry multimedia streams and power-limited mobile devices has to be resolved. The effort for providing a universal rich-media experience across any screen is typically hindered by the heterogeneity amongst ever-evolving mobile devices, as manifested in their different physical form factors, middleware platforms, and interactive functions.

Furthermore the developments of innovative pervasive mobile services, e.g., mobile video streaming, rich media dissemination, surveillance, gaming, e-health care, etc., can be greatly facilitated by mobile cloud computing platforms employing emerged and emerging technologies.

Information Technology:

Today IT is faced with the challenge of trying to respond to rapidly changing business environments on limited budgets, needing to support legacy applications as well as new modern software applications. Cloud computing offers substantial benefits in terms of agility and cost-effectiveness but cloud platforms are not commodities, with one easily substituted for another. Today, most companies want and need to have both onsite and offsite IT environments. Most cloud offerings, though, are only designed to run new applications, not support older legacy ones.

- a) Technology availability: technology roadmaps in the hardware and network sectors are highly predictable. The innovation clock speed however is largely determined by the underlying technology
- b) Socio-economic trends: further innovation in the software and service sector is driven by emerging socio-economic trends. New mechanisms for distributed storing and processing of data had to be developed rather quickly building upon fundamental research results in academia earlier which were advanced by industry and brought into a new industrial application environment

Some amazing advances in cloud computing:

Genetic Sequencing

Using powerful supercomputers to help with cancer research isn't exactly new — but moving the scientific calculations to the cloud marks a major undertaking. Analyst [Charles King](#) says this is a significant project in two major ways: One, it's trying to understand the genomic sequencing that occurs in brain cancer patients, and two, it's showing how the cloud is maturing. The [cloud-based version of IBM Watson](#) can scan databases and learn how to customize treatments to patient DNA.

Microsoft Office 365 for iPad

This advancement might not seem that world-changing, although it's surprising that Microsoft has finally launched [Office apps on the Apple iPad](#). What is game-changing for business users: The apps sync securely to the cloud. The apps are also free for business users who've already standardized on Office 365 and pay the monthly Web usage storage fees. Importantly, the apps were designed for tablet use, meaning they support swiping and other gestures.

Box View:

Writing code for the cloud might be about as dull as a routine health exam, but Box is making it as easy as possible. One innovation, [Box View](#), essentially gives even nonprogrammers a way to upload a business document and create rich HTML sites with an embedded document viewer. It's also a sign of things to come — that is, the cloud will continue to evolve in terms of developing custom apps and features that match business needs.

Amazon WorkSpaces:

Offering a virtual desktop to employees has always presented one great IT challenge: Making sure the desktop is always available and tuned for speedy performance. Amazon recently started offering [Workspaces](#), a cloud-based desktop that runs on laptops and tablets. The main innovation of Amazon WorkSpaces concerns network optimization using Amazon Web Services; this provides the same kind of availability you've come to expect from a cloud storage service or custom application.

SmartVue

Video surveillance in a corporate setting is a different beast from home surveillance; there are likely policies about encrypting the signal, storing the recorded video and managing the cameras, among other things. The [Smartvue](#) cloud surveillance servers let you view and manage cameras from a Web browser. Security cameras installed on premises can link to the cloud server for policy management, storage and security controls.

Conclusion:

Thus this report covers the major regions where the Cloud Computing technology is showing its major feat of advance and sure to be even a more undeniable technology of the near future. Thus Cloud computing technology is indeed a paradigm shift in majority of the fields in our day to day use.

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