

PERSPECTIVES ON THE USE OF CLOUD SERVICES

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PRESENTATION OUTLINE

- **The Cloud Technology Concept**
- **The Impacts**
- **Service Models**
- **Deployment Models**
- **Essential Characteristics Models**
- **The Benefits of Cloud Technology**
- **Risks and Security Concerns**
- **Competition and Consumer Concerns**
- **The Way Forward**

* OVERVIEW

“The promise of cloud computing is arguably revolutionizing the IT services world by transforming computing into an ubiquitous utility.” (ISACA, 2009)

- **Attracted wide attention since its beginning in 1991**
- **On track in becoming mainstream in IT industry**

A multiplicity of possibilities:

- **safety, convenience, data sharing**
- **more reasons for internet usage and development.**

*** A Computer Cloud – connected computers and servers to form a computer cloud in remote data center.**

It is understood to be....

*** *a model for enabling 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 (ISACA, 2009).***

* THE CONCEPT...

- * **Lower Entry Barriers - Level the playing field for small companies (especially IT infrastructure).**

Story from Nairobi, Kenya, published in the New York Times

- * **Wilfred Mworio, Nairobi, Kenya, 22 year old engineering student and freelance code writer in Nairobi Kenya.**
- * **Developed an app for Apple's new iPhone using the online iPhone simulator.**

THE IMPACTS OF CLOUD TECHNOLOGY

* IMPACTS... CONT'D

- * **Mr. Mworio is quoted as saying... "Even if I don't have an iPhone ... I can still have a world market for my work".**



- * **The Lesson:- Developers from the developing countries are in a better position to compete directly with developers working from Silicon Valley or Colorado or New York.**

* IMPACTS... CONT'D

Computing is now a Ubiquitous Utility

- **Revolutionizing the IT services world by transforming computing into a ubiquitous utility, leveraging on attributes such as increased agility, elasticity, storage, capacity and redundancy to manage information assets.**

New Business Model - " Pay As You Go"

- **Enterprises can take advantage of using services in an on-demand model.**
- **Less up-front capital expenditure needed.**
- **Allows businesses increased flexibility with new IT services.**

* IMPACTS... CONT'D

Abstraction - Data Owner & Service Provider

- **Data owner no longer in direct control of the physical environment.**
- **Result - Widespread demand for greater transparency and assurance approaches**

Removal of Overseas Staff & Support

- **Transacting with new global partners is significantly easier and less expensive using cloud**
- **Allows more flexibility to transact with multiple business partners in different regions.**

* CLOUD COMPUTING SERVICE MODELS

Service Model	Definition	To Be Considered
Infrastructure as a Service (IaaS)	Capability to provision processing, storage, networks and other fundamental computing resources, offering the customer the ability to deploy and run arbitrary software, which can include operating systems and applications. IaaS puts these IT operations into the hands of a third party.	Options to minimize the impact if the cloud provider has a service interruption
Platform as a Service (PaaS)	Capability to deploy onto the cloud infrastructures customer-created or acquired applications created using programming languages and tools supported by the provider	<ul style="list-style-type: none"> • Availability • Confidentiality • Privacy and legal liability in the event of a security breach (as databases housing sensitive information will now be hosted offsite) • Data ownership • Concerns around e-discovery
Software as a Service (SaaS)	Capability to use the provider's applications running on cloud infrastructure. The applications are accessible from various client devices through a thin client interface such as a web browser (e.g., web-based e-mail).	<ul style="list-style-type: none"> • Who owns the applications? • Where do the applications reside?

* DEPLOYMENT MODELS

Deployment Model	Description of Cloud Infrastructure	To Be Considered
Private cloud	<ul style="list-style-type: none"> • Operated solely for an organization • May be managed by the organization or a third party • May exist on-premise or off-premise 	<ul style="list-style-type: none"> • Cloud services with minimum risk • May not provide the scalability and agility of public cloud services
Community cloud	<ul style="list-style-type: none"> • Shared by several organizations • Supports a specific community that has shared mission or interest. • May be managed by the organizations or a third party • May reside on-premise or off-premise 	<ul style="list-style-type: none"> • Same as private cloud, plus: • Data may be stored with the data of competitors.
Public cloud	<ul style="list-style-type: none"> • Made available to the general public or a large industry group • Owned by an organization selling cloud services 	<ul style="list-style-type: none"> • Same as community cloud, plus: • Data may be stored in unknown locations and may not be easily retrievable.
Hybrid cloud	A composition of two or more clouds (private, community or public) that remain unique entities but are bound together by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load balancing between clouds)	<ul style="list-style-type: none"> • Aggregate risk of merging different deployment models • Classification and labeling of data will be beneficial to the security manager to ensure that data are assigned to the correct cloud type.

Characteristic	Definition
On-demand self-service	The cloud provider should have the ability to automatically provision computing capabilities, such as server and network storage, as needed without requiring human interaction with each service's provider.
Broad network access	According to NIST, the cloud network should be accessible anywhere, by almost any device (e.g., smart phone, laptop, mobile devices, PDA).
Resource pooling	The provider's computing resources are pooled to serve multiple customers using a multitenant model, with different physical and virtual resources dynamically assigned and reassigned according to demand. There is a sense of location independence. The customer generally has no control or knowledge over the exact location of the provided resources. However, he/she may be able to specify location at a higher level of abstraction (e.g., country, region or data center). Examples of resources include storage, processing, memory, network bandwidth and virtual machines.
Rapid elasticity	Capabilities can be rapidly and elastically provisioned, in many cases automatically, to scale out quickly and rapidly released to scale in quickly. To the customer, the capabilities available for provisioning often appear to be unlimited and can be purchased in any quantity at any time.
Measured service	Cloud systems automatically control and optimize resource use by leveraging a metering capability (e.g., storage, processing, bandwidth and active user accounts). Resource usage can be monitored, controlled and reported, providing transparency for both the provider and customer of the utilized service.

The Benefits and Risk - Dependent on the types of service and deployment models selected. Some of the key business benefits offered by the cloud include:

- ✓ **Reduced Cost - Reducing infrastructure costs - Business**
can focus on innovation to better serve customers and gain business advantage.
- ✓ **Immediacy - From week and Months to a Single day.**

*** BENEFITS OF CLOUD TECHNOLOGY**

✓ **Availability**

Infrastructure and bandwidth to meet business requirements for high speed access, storage and applications.

✓ **Scalability**

Increased flexibility and scalability for evolving needs.

BENEFITS... CONT'D

✓ **Efficiency & Opportunities for Innovation**

Reallocating to the cloud offers businesses an opportunity to focus efforts on innovation and research and development.

Result - Business and product growth

✓ **Resiliency**

- * **Disaster Recovery**
- * **Load-balancing traffic**
- * **Resiliency and Capacity to ensure sustainability**

BENEFITS... CONT'D

- Risks associated with cloud computing are not new
- Risk Management Activities will be crucial

* RISKS AND SECURITY CONCERNS

* RISKS ... CONT'D

“Third Party Risks”

**Not just using the services and technology,
but also must deal with the provider's:**

- **Organization Structure**
- **Architecture**
- **Organizational Culture and Policies.**

*RISKS ... CONT'D

Finding the “Perfect” Provider

- **Factors to Consider:- Reputation, History and Sustainability.**

Confidentiality – IP and Trade Secrets

- **Third-party access to sensitive information creates a risk of compromise to confidential information.**

*RISKS ... CONT'D

Where is My Data Stored?

- **Confusion as to where data actually resides.**
- **How soon can it be retrieved?**
- **How secure is the data?**

* **COMPETITION AND CONSUMER CONCERNS**

Anti-competitive Agreements

- **e.g. Apple iPhone Apps Agreement (Sept. 2010)**

Abuse of Dominant Position

- **Market Definition - From products to services**
- **Tying - IBM Investigation re: software emulations & transition from legacy systems**
- **Network effects & lock-ins**
e.g. **Data portability & switching costs**

Territoriality

- **What laws should be applied?**

* **THE WAY FORWARD**

- **Paradigm shift and nature of services raise many assurance issues.**

- **Users of cloud technology (directly or indirectly) must be made to feel that they can trust in the software services and infrastructure that make up the cloud.**

* THE WAY FORWARD... CONT'D

Some of the key assurance issues that will need to be addressed are:

- **Transparency**
- **Privacy**
- **Compliance**
- **Trans-border Information Flow**
- **Certification & Tools**
- **Service Contracts**
- **Improved Service Guarantees**
- **Interoperability Tools**

* CONCLUSION

While there are certain benefits, there must be:

- **Business Impact Analyses**
- **Risk Assessments**
- **Navigator?**