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Mobile cloud e-business models, services, and applications

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Abstract
Cloud computing has become from a theoretical concept into the real applications in different industries such as telecommunication and healthcare. Its influences on different industries have also attracted much attention.E-commerce businesses and industry were influenced by cloud computing in technical architecture, service modes and the industrial chain. It analyzed driving-forces the changes of E-commerce in cloud era.It only when the E-commerce enterprises involved cloud computing in the business strategy and established the core competencies,could realize the development in the cloud area. The computing resources, environments of computing, and online application services have been moved to a computing environment based on mobile.Cloud computing is emerging as one of the most important branch for providing applications on mobile devices. The cloud computing is introduced as a new and speedily growing and accepted way of providing better and efficient applications for mobile devices. It provides mobile users with data storage and processing services on a cloud computing platform. While considering about challenges we have identified/discussed various issues regarding mobile devices, mobile network, mobile applications and some major security concerns.

Keywords: Mobile Cloud Computing,Cloud Computing,E-Business models,Mobile Cloud Services,Mobile Cloud Applications

1. Introduction
The term "cloud computing" is mainly in the context of the "future of the web". E-commerce is a typical industry which is being influenced inevitably by the features of cloud computing. The impacts of cloud computing on the traditional E-commerce respectively from the perspective of technology, service and industry chain and presents the necessary suggestions on the development of E-commerce businesses in the cloud area.They are generally two options either they write for just one OS or they just create many versions of the same application. In any mobile device for any application execution two basic significant requirements are of processing power and memory of device capable of supporting that corresponding application.And also need for Mobile application developers to create many versions of same application. The mobile application development there is still a long way to go to achieve a new mobile world infrastructure involving cloud computing in its base.Cloud computing exists when tasks and data are kept on the Internet rather than on individual devices, providing on-demand access. Applications are run on a remote server and then sent to the user.

2. Cloud Computing
Cloud computing is groups of remote servers are networked to allow centralized data storage and online access to computer services or resources. Clouds can be classified as public, private or hybrid.The criticisms about mainly focused on social implications. This happens when the owner of the remote servers is a person or organisation other than the user, as their interests may point in different directions, for example, the user may wish that his or her information is kept private, but the owner of the remote servers may want to take advantage of it for their own business.A cloud service has three distinct characteristics that differentiate it from traditional hosting. It is sold on demand, typically by the minute or the hour; it is elastic -- a user can have as much or as little of a service as they want at any given time; and the service is fully managed by the provider.

3. Mobile Cloud Computing
Mobile cloud computing (MCC) at its simplest, refers to an infrastructure both the data storage and data processing the mobile device.Mobile cloud applications move the computing power and data storage from the mobile devices and into powerful and centralized computing

platforms located in clouds, then accessed over the wireless connection based on a client.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 cost and 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.

Fig 1: Mobile Cloud

Mobile Cloud Computing (MCC) is the combination of cloud computing, mobile computing and wireless networks to bring rich computational resources to mobile users, network operators, as well as cloud computing providers.The ultimate goal of MCC is to enable execution of rich mobile applications on a plethora of mobile devices, with a rich user experience.MCC provides business opportunities for mobile network operators as well as cloud providers.More comprehensively, MCC can be defined as "a rich mobile computing technology that leverages unified elastic resources of varied clouds and network technologies toward unrestricted functionality, storage, and mobility to serve a multitude of mobile devices anywhere, anytime through the channel of Ethernet or Internet regardless of heterogeneous environments and platforms based on the pay-as-you-use.

4. Mobile Cloud E-Business Models

E-Business-A company that has an online presence

- E-commerce businesses allow customers to sell, trade and barter over the Web
- A company's policy, operations, technology and ideology define its business model

Amid the dot com fever and the letter "e " prefixing just about everything, it is helpful to set out some parameters to define what is meant by e-business. There are three key areas in which the Internet will impact on a business.E-commerce – this involves selling online and managing the organisation's relationship with the customer. It includes email marketing and gathering information about the customer.E-working – this relates to the organisation's internal processes and covers areas such as product development, training,financial planning and recruitment.E-procurement – this concerns the organisation's relationship with its suppliers and includes product sourcing, purchase process management and account payable management.The Internet and Internet Protocol (IP) technology is the driving force behind the growth of e-business. The open standards of IP and the rate at which organisations are adopting them are creating a platform on which a wide range of business applications and communication technologies are being developed. The accessibility and relatively low cost of the Internet is bringing all players online – businesses and consumers, buyers and suppliers resulting in a new business environment and new ways of doing business.

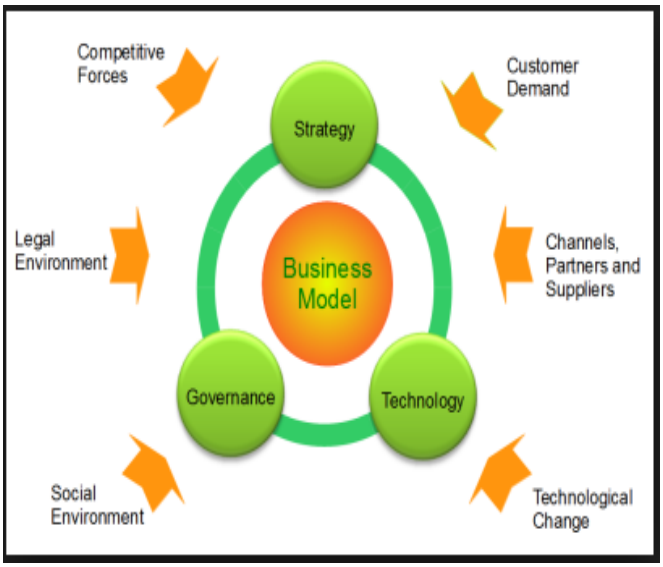

Fig 2: E-Business model

4.1 Business-to-Business (B2B) Models

- Business-to-business (B2B) – applies to businesses buying form and selling to each other over the Internet
- E-procurement – the B2B purchase and sale of supplies and services over the Internet
- Systematic sourcing – involves buying through prenegotiated contracts with qualified suppliers
- Spot sourcing – businesses buy transaction-oriented commodity-like products and rarely involves a long-term or ongoing relationship between buyers and sellers

4.2 Consumer-to-Consumer (C2C)

- Consumer-to-business (C2B) – applies to any consumer that sells a product or service to a business over the Internet
- C2B facilitates the following:
- Social interaction
- Personal finance management
- Purchasing products and information
- Consumer-to-consumer (C2C) – appliers to sites primarily offering goods and services to assist consumers interacting with each other over the Internet
- C2C communities thriving on the Internet:
- Communities of interest
- Communities of relations
- Communities of fantasy

4.3 E-Business Challenges

- Cost
- Value
- Security
- Leverage existing systems
- Interoperability

5. Mobile Cloud Services

The cloud computing market is a living, breathing animal, with Amazon Web Services serving as the heart and lungs of this beast. But there are many other PaaS and IaaS providers that serve as the adrenalin that keeps the cloud market moving at a fast pace.In this feature, the SearchCloudComputing.com team examines 13 cloud service providers -- big and small -- that enterprise IT and other cloud consumers should watch in 2013. While these purveyors of cloud may not be trying to go head-to-head with the almighty Amazon Web Service (AWS), they're making inroads in Infrastructure as a Service (IaaS) and Platform as a Service (PaaS) offerings in significant ways. Some of the cloud vendors on this list are well-established in the cloud market; others are just starting to make a name for themselves. And while it's difficult to predict which vendors will stay on a roll, and which will not, there's little doubt these 13 cloud service providers have set themselves up to succeed.A number of researchers have introduced service clouds for mobile cloud computing and named Mobile service clouds. A lot of their model enables dynamic embodiment,installation, arrangement and rearrangement of services to beused by the mobile users.

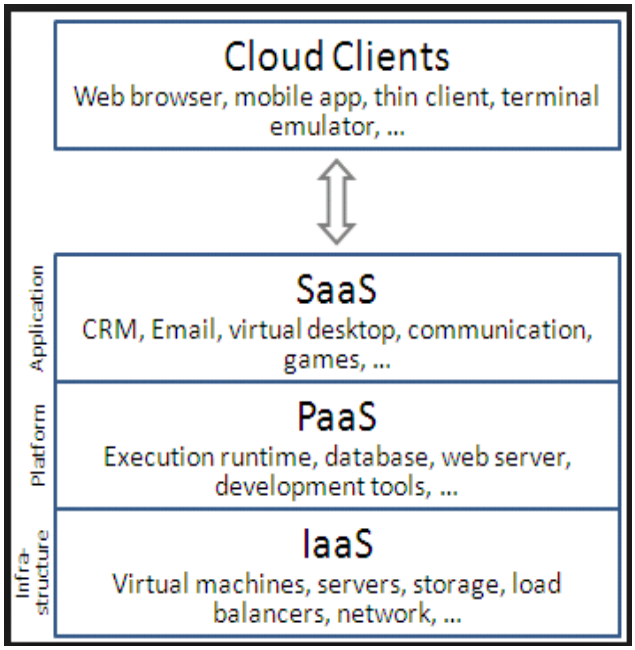

Fig 3 Mobile Cloud Service

- Reduce the complexity of networks.
- Do not have to buy software licenses.
- Customization.
- Cloud providers that have specialized in a particular area(such as e-mail)can bring advanced services that a single company might not be able to afford or develop.
- Scalability,reliability,and efficiency

6. Mobile Cloud Application

There are various applications of cloud computing in today's network world. Many search engines and social websites are using the concept of cloud computing like www.amazon.com,hotmail.com,facebook.com, linkedln.com etc. the advantages of cloud computing in context to scalability is like reduced risk , low cost testing ,ability to segment the customer base and auto-scaling based on application load.

6.1 Mobile Cloud Application

- Mobile Commerce
- Mobile Learning
- Mobile Healthcare
- Mobile Gaming

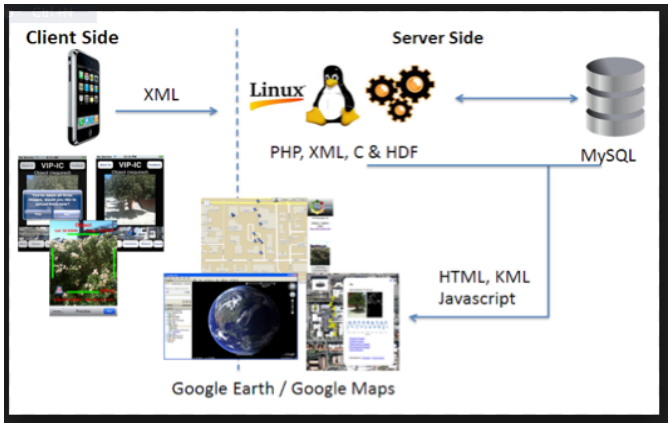

Fig 4: Mobile Cloud Application

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6.1.1 Mobile Commerce

- M-commerce allows business models for commerce using mobile devices.
- Examples: Mobile financial, mobile advertising, mobile shopping…
- M-commerce applications face various challenges (low bandwidth, high complexity of devices, security,Integrated with cloud can help address these issues.
- Example: Combining 3G and cloud to increase data processing speed and security level.

6.1.2 Mobile Learning

- 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.

6.1.3 Mobile Healthcare

- M-healthcare is to minimize the limitations of traditional medical treatment (eg. Small storage, security/privacy, medical errors,).
- M-healthcare provides mobile users with convenient access to resources (eg. medical records).
- M-healthcare offers hospitals and healthcare organizations a variety of on-demand services on clouds. Examples
- Comprehensive health monitoring services.
- Intelligent emergency management system.
- Health-aware mobile devices (detect pulse-rate, blood pressure, level of alcohol etc).

6.1.4 Mobile Gaming

- M-game is a high potential market generating revenues for service providers.
- Can completely offload game engine requiring large computing resource (e.g., graphic rendering) to the server in the cloud.
- Offloading can also save energy and increase game playing time (eg. MAUI allows fine-grained energy-aware offloading of mobile codes to a cloud).

7. Mobile Cloud Architecture

Mobile devices are connected to the mobile networks via base stations that establish and control the connections and functional interfaces between the networks and mobile devices.Mobile users' requests and information are transmitted to the central processors that are connected to servers providing mobile network services.The subscribers' requests are delivered to a cloud through the Internet. In the cloud, cloud controllers process the requests to provide mobile users with the corresponding cloud services.

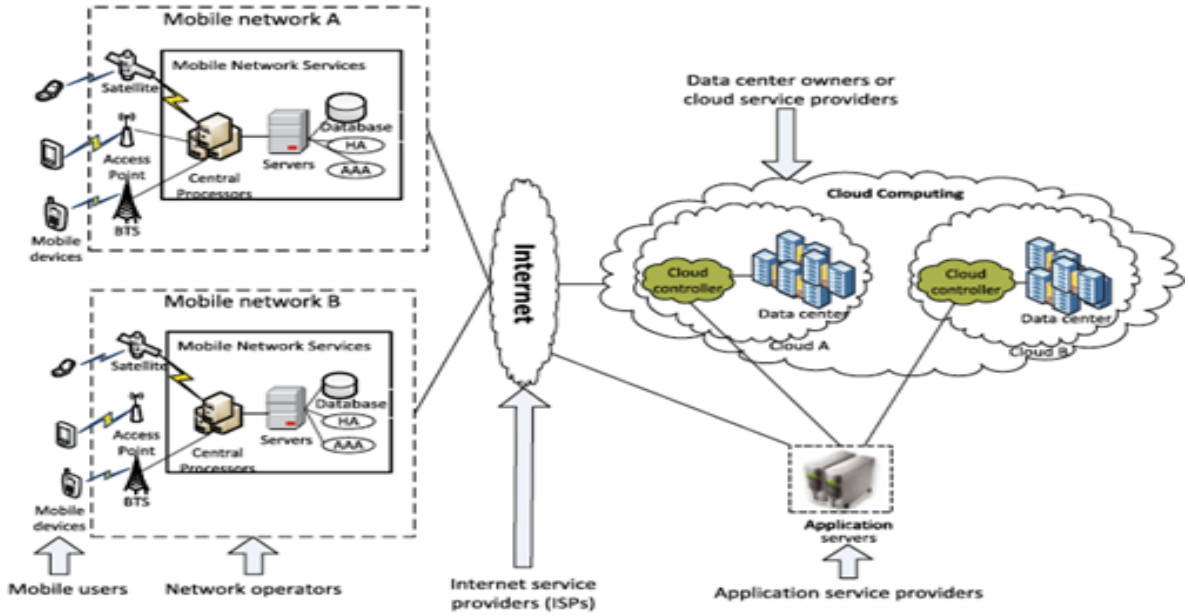

Fig 5: Mobile Cloud Architecture

A lot of the mobile apps that you use everyday on your smart phone or tablet are in fact pecialized browsers that connect you to the cloud and that is where the real magic is happening. We call this a mobile cloud computing architecture in which your mobile app is the client and the server is the hosted software in the cloud. The server side software may or may not be directly accessible via a desktop browser, but for sure it provides a specialized interface that your mobile app communicate with. We call that an API or Application Programming Interface.

8. Mobile Cloud Computing Issues

- Low bandwidth: One of the biggest issues, because the radio resource for wireless networks is much more scarce than wired networks.
- Service availability: Mobile users may not be able to connect to the cloud to obtain a service due to traffic congestion, network failures, mobile signal strength problems.
- Heterogeneity: Handling wireless connectivity with highly heterogeneous networks to satisfy MCC requirements (always-on connectivity, on-demand scalability, energy efficiency) is a difficult problem.

9. Advantages of Mobile Cloud Computing

- Cost Efficient
- Almost Unlimited Storage
- Backup and Recovery
- Automatic Software Integration
- Easy Access to Information
- Quick Deployment

10. Disadvantages of Mobile Cloud Computing

- Technical Issues
- Security in the Cloud
- Prone to Attack

11. Cloud Computing Vs Mobile Cloud Computing

CLOUD COMPUTING	MOBILE CLOUD COMPUTING
Cloud computing, allows you to store your files and folders in a "cloud" area on the Internet, allowing you access to all of your files and folders wherever you are in the world – but you do need a physical device with Internet access to access it.	**Mobile computing** is taking a physical device with you. This could be a laptop or a mobile phone or some device which enables you to working because of the small size of the device you're using.
Cloud computing relates to the specific design of new technologies and services that allow data to be sent over distributed networks, through wireless connections, to a remote secure location that is usually maintained by a vendor.	Mobile computing relates to the emergence of new devices and interfaces. Mobile computing functions include accessing the Internet through browsers, supporting multiple software applications with a core operating system, and sending and receiving different types of data.
Cloud service providers usually serve multiple clients. They arrange access between the client's local or closed networks, and their own data storage and data backup systems.	The mobile operating system, as an interface, supports users by providing intuitive icons, familiar search technologies and easy touch-screen commands.

12. Conclusion

The emergence of cloud computing is creating a new service ecosystem which will integrate all the E-commerce resources and facilitate the new service modes. For the E-commerce providers, cloud computing is creating the good opportunities while threatening their existence.The computing resources and environments of computing, and online application services are moving to a computing environment based on mobile.The term cloud computing is no longer an industry buzzword and signals a transformational shift in how business data and e-commerce applications will be stored, accessed, shared, and transacted online.In tandem, mobile applications and services will be provisioned from the cloud offering a myriad of ways for the end user to engage e-commerce operations.

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