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Secured Communication Model for Mobile Cloud Computing

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ABSTRACT:
As Cloud computing provides on-demand access to computational resources which together with pay-per use business models; enable application providers seamlessly scaling their services. Cloud computing infrastructures allow creating a variable number of virtual machine instances depending on the application demands. An attractive capability for Software-as-a-Service (SAAS) providers is having the potential to scale up or down application resources to only consume and pay for the resources that are really required at some point in time; if done correctly, it will be less expensive than running on regular hardware by traditional hosting.Major issue cloud computing facing today is security to eliminate this problem this paper is providing poly alphabetic cipher method in a mobile application.. We present a novel approach to use high speed interconnected cluster in a cloud computing environment
\.environment. and evaluate the performance.

I. INTRODUCTION

A technology that has fastest growing segments in IT and shown its high growth rate in the last few years, is Cloud Computing. The technology uses the Internet and central remote servers to maintain data and applications. Cloud computing allows consumers and businesses to use applications without installation and access their personal files at any computer with internet access. This technology allows for much more efficient computing by centralizing storage, memory, processing and bandwidth. Author of has reviewed that Cloud Computing is composed of three well-known layers. Infrastructure-as-a-Service (IaaS) layer is in charge of providing on-demand virtual infrastructures to third-parties using physical resources such as memory, storage and processors. This virtual infrastructure typically allocates resources from data centers owned and managed by the cloud provider and are used by customers through the Internet.

The Platform-as-a-Service (PaaS) layer provides automatic provisioning of ready-to-use middleware services. Finally, the Software-as-a-Service (SaaS) layer makes use of the previous layers to offer end-user software services to customers.

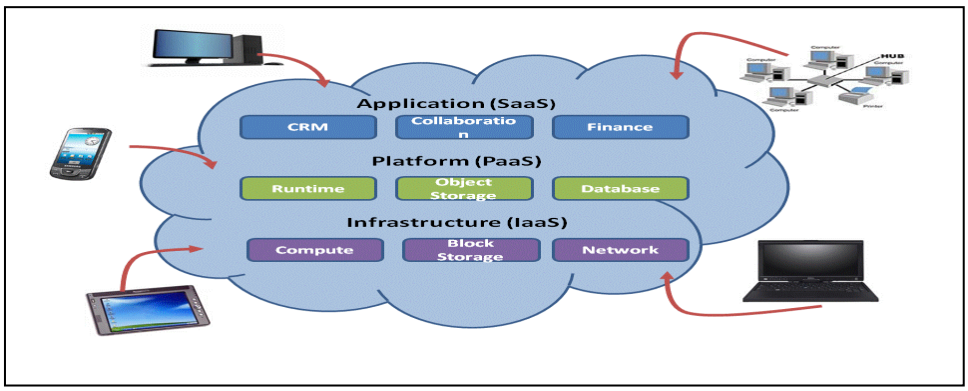

Figure 1: Service Model of Cloud Computing

1.1 Cloud Deployment Models

IT companies are providing services to the general public for a fee on-demand. This type of service is called Public Cloud. On the other hand if the service is solely used within an organization and not shared with people outside of the organization it is called Private Cloud. There is also a third kind, a combination of public and private cloud. It is referred to as Hybrid. The cloud infrastructure is shared by several organizations and supports a specific community that has shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be managed by the organizations or a third party and may exist on premise or off premise [3]. Example: eBay. Choosing which one to deploy purely depends on the needs.

1.2 Challenges

Two important concerns in a cloud based environment are security and performance. A lot of research is currently underway to analyze how clouds can provide High Performance Computing (HPC) capabilities. Since the data centers are highly data intensive it is imperative that high performing applications should be developed and deployed in the cloud to truly take advantage of them.

1.3 Comparisons with Other Computing

Cloud computing can be confused with:

Grid Computing:- A form of distributed computing and parallel computing, whereby a 'super and virtual computer' is composed of a cluster of networked, loosely coupled computers acting in concert to perform very large tasks.

Utility Computing:-The packaging of computing resources, such as computation and storage, as a metered service similar to a traditional public utility, such as electricity.

Autonomic Computing:- Computer systems capable of self-management.

1.4 Definition of Cloud

The name cloud computing was inspired by the cloud symbol that's often used to represent the Internet in flow charts and diagrams.

NIST definition of Cloud Computing is "Cloud computing is a model for enabling ubiquitous, 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. This cloud model promotes availability and is composed of five essential characteristics, three service models, and four deployment models."

Essential characteristics of Cloud Computing are the main items in its definition. They emphasize new aspects of this model which discriminate it from other computing models.

1. **On-demand self-service:** A cloud consumer can provision computing resources without human intervention.

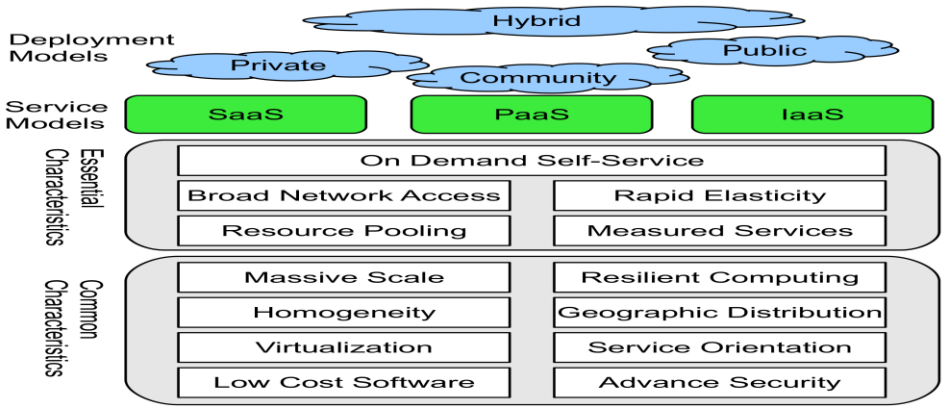

Figure 2: Definition of Cloud

2. Broad network access: Cloud Computing utilizes existing networking technologies to deliver services to customers and provide connectivity among stakeholders.

3. Resource pooling: Each cloud provider has several customers. Customer's provision computing resources dynamically from a resource pool and release them to the pool when there is no demand.

4. Rapid elasticity: Provisioning of resources can happen rapidly; also the demand for resources may vary dynamically. When the demand increases, more resources are provisioned to scale out1 and when it decreases, provisioned resources are released to scale in. This procedure happens quite fast.

5. Measured services: A pay-per-use business model is employed to measure the resource usage. Resource usages for different type of services are metered based on the service type criteria. Also the provisioning is managed and reported to required stakeholders.

This paper provides a new mechanism of security for the mobile cloud computing. Section 1 gives the brief introduction of cloud computing, section 2 gives the brief introduction of mobile cloud computing. Section 3 details about the researches been done in this area and elaborates some prominent existing work done by the researchers. Section 4 provides the details of the proposed work in this research.

1. Mobile Cloud Computing

Mobile cloud computing is the usage of cloud computing in combination with mobile devices. Cloud computing exists when tasks and data are kept on the Internet rather than on individual devices, providing on-demand access [1].

Applications are run on a remote server and then sent to the user. Because of the advanced improvement in mobile browsers thanks to Apple and Google over the past couple of years, nearly every mobile should have a suitable browser. This means developers will have a much wider market and they can bypass the restrictions created by mobile operating systems [2].

Mobile cloud computing gives new company chances for mobile network providers. Several operators such as Vodafone, Orange and Verizon have started to offer cloud computing services for companies.

Alibaba Group launched cloud computing-based operating system Aliyun on 29th July 2011. The Aliyun operating system will feature cloud services such as email, Internet search and support for web-based applications [1]. Users are not required to download or install applications onto their mobile devices.

2.1 Applications

Mobile applications are a rapidly developing segment of the global mobile market. They consist of software that runs on a mobile device and perform certain tasks for the user of the mobile phone. As reported by World Mobile Applications Market, about 7 billion (free and paid) application downloads were made globally in 2009 alone from both native and third-party application stores, generating revenues of $3.9 billion in the same year. The global mobile application market is expected to be worth $24.4 billion in 2015, growing at a CAGR of 64% from 2009 to 2015. Apple is a typical example for the explosion of mobile applications[6]. Apple with a whopping more than 4 billion downloads to date commanded more than 90% of the application market share in 2009. The success of Apple's App Store has not only established the scalability of mobile applications, but has also shown that the best of these offer the potential to generate enormous revenues.

2.2 Convenient Commerce

The explosion in the use of electronic commerce (e-commerce) by the business sector has been tremendous since its inception only a few years ago. E-commerce is known as: buying and selling of products or services over electronic systems such as the Internet and other computer networks. From governments to multinational companies to one-person start-ups, e-commerce is increasingly viewed as a key business modality of the future. Ease of transaction, widening markets, and decreased overheads are factors that make e-commerce solutions more and more attractive, as evident with the growth of on-line sales.

Mobile Learning

Mobile learning today is becoming more popular as there are many people using mobile devices to enhance their learning. Mobile learning (m-learning) is not only electronic learning (e-learning) but e-learning plus mobility. It is clear that learning via mobile brings many benefits for mobile users. It brings the convenience for them since they can learn anywhere they want in any convenient time from a portable device. However, there is some research pointing out restrictions of traditional mobile learning such as: expensive mobile devices, high cost of network, poor network transmission rate, and limited educational resources. As a result, it is difficult for mobile learning to take full advantage and to be popular as well.

2.3 Mobile Healthcare

The development of telecommunication technology in the medical field helped diagnosis and treatment become easier for many people. This can helps patients regularly monitor their health and have timely treatment[8]. Also, it leads to increase accessibility to healthcare providers, more efficient tasks and processes, and the improvement about quality of the healthcare services. Nevertheless it also has to face many challenges (e.g., physical storage issues, security and privacy, medical errors). Therefore cloud computing is introduced as a solution to address aforementioned issues. Cloud computing provides the convenience for users to help them access resources easily and quickly[8]. Besides, it offers services on demand over the network to perform operation that meet changing needs in electronic healthcare applications.

2.4 Mobile Computing

The analysis of the impact of mobile computing on the various services shows how the mobile computing has changed each service. As mobile computing has become more popular over the past decade, it has been under continuous development with advances in hardware, software and network. Mobile computing has applications in our everyday life. Use of this technology has become a fundamental skill.

With mobile computing we can check our email messages, our bills, our bank accounts and our other private information just by using a mobile phone or laptop anywhere[8]. All the functionalities obligate each exchange data to make it safe and immune from any attack. Mobile computing services have simplified our lives. Every day we get attached to a new device that includes a lot of functionalities and is based on mobile computing, as examples, I-Phone from Apple, Net-Book, etc.

2.5 Concept & Architecture of Mobile Cloud Computing

Similar with Cloud Computing, there are a lot but nonconsensual definitions on what mobile cloud computing is . In this work, we consider it is a novel computing mode consisting of mobile computing and cloud computing, which provide cloud based services to users through the Internet and mobile devices. On one hand, the mobile cloud computing is a development of mobile computing, and an extension to cloud computing. In mobile cloud computing, the previous mobile device-based intensive computing, data storage admass information processing have been transferred to 'cloud 'and thus the requirements of mobile devices in computing capability and resources have been reduced, so the developing, running, deploying and using mode of mobile applications have been totally changed. On the other hand, the terminals which people used to access and acquire cloud services are suitable for mobile devices like Smartphone, PDA, Tablet, and I-Pad but not restricted to fixed devices (such as PC),which reflects the advantages and original intention of cloud computing. Therefore, from both aspects of mobile computing and cloud computing, the mobile cloud computing is a combination of the two technologies, a development of distributed, grid and centralized algorithms, and have broad prospects for application.

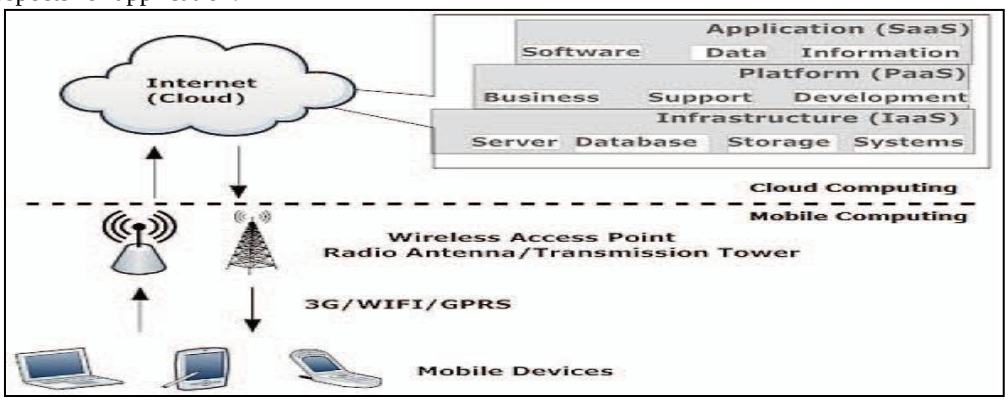

Figure 3: Mobile Cloud Computing Architecture

As shown is the Figure 3, mobile cloud computing can be simply divided into cloud computing and mobile computing. Those mobile devices can be laptops, PDA, Smartphone, and so on. Which connects with a hotspot or base station by 3G, WIFI, or GPRS? As the computing and major data processing phases have been migrated to 'cloud', the capability requirement of mobile devices is limited, some low-cost mobile devices or even non-Smartphone can also achieve mobile cloud computing by using a cross-platform mid-ware. Although the client in mobile cloud computing is changed from PCs or fixed machines to mobile devices, the main concepts still cloud computing. Mobile users send service requests to the cloud through a web browser or desktop application, then the management component of cloud allocates resources to the request to establish connection, while the monitoring and calculating functions of mobile cloud computing will be implemented to ensure the QOS until the connection is completed.

2.6 Challenges in Mobile Cloud Computing

The main objective of mobile cloud computing is to provide a convenient and rapid method for users to access and receive data from the cloud, such convenient and rapid method means accessing cloud computing resources effectively by using mobile devices. The major challenge of mobile cloud computing comes from the characters of mobile devices and wireless networks, as well as their own restriction and limitation, and such challenge makes application designing, programming and deploying on mobile and distributed devices more complicated than on the fixed cloud devices[2].

For a given standard, providing a quality guaranteed cloud service should consider the following facts: optimal division of application between cloud and mobile device, interaction between low-latency and code offload, high-bandwidth between cloud and mobile device for high speed data transmission, user-oriented cloud application performance, self-adaptation mechanism of mobile cloud computing, and optimal consumption and overhead of mobile devices and cloud servers. The following strategies can be used to response to the challenges:

1. Upgrade bandwidth for wireless connection, make the web content more suitable for mobile network using regional data centers.
2. Deploy the application processing node at the 'edge' of cloud in order to reduce data delivery time.
3. Duplicate mobile devices to cloud using virtualization and image technologies, to process Data-Intensive Computing (DIC) and Energy-Intensive Computing, such as virus scanning in mobile devices.
4. Dynamically optimize application push in cloud and the division with mobile terminals.

II. EXISTING SYSTEM

Mobile cloud computing which combines mobile computing, mobile internet, and cloud computing, has become an important research area in the information technology since 2009. By introducing the concept and features of mobile cloud computing, we analyze the system structure of mobile cloud computing. Meanwhile, the security threats present in mobile cloud computing environment are given, and solutions for against the corresponding threat are introduced [1]. Finally, an improved security service scheme is put forward to help realize the controllability, customizability and adaptability of the mobile cloud computing environment in this paper. Mobile Cloud Computing is a new concept, which offers Cloud resources and services for mobile devices. It also brings several advantages to mobile devices and to the applications developed for them. However, it increases the security risks and privacy invasion due to the fact that it combines mobile devices with Cloud services and because there is not a well-defined application model[2]. The security issues are treated independently and the existing security solutions are supplied separately by various providers. In this paper, we propose a framework to secure the data transmitted between the components of the same mobile cloud application; and to ensure the integrity of the applications at the installation on the mobile device and when being updated. Our framework allows applying different security properties to different kinds of data and not the same properties to all the data processed by the application. Also our approach takes into consideration the user preferences and the mobile device performances. The mobile terrain is rapidly establishing itself as the reliable node for accessing cloud hosted data. Today, commodity cloud providers especially from the Infrastructures-a-Service (IAAS) cloud expose their service APIs which facilitates the "app-frication" of enterprise workflows on mobile devices. However, these IAAS providers require the customer (i.e., the data consumer) to submit multiple security credentials which are computation intensive for the purposes of authentication and authorization. As a result, the authentication process introduces undesired delays in a mobile network when consuming enterprise data due to the increasing computational demand and the voluminous HTTP header that is transported across the wireless bandwidth.

III. PROPOSED WORK

From the challenges as discussed above, the major issue in implementing mobile cloud computing is to divide the application on the mobile device in such a way so that it will require least resources on mobile device and will apply minimum load on network to get the processing done on the cloud and display results to the user. It also faces the problem of security of the data from the network users and over the cloud.
This work is offering to provide security of the mobile data for both the security over cloud and encryption / decryption of the data over the network. The algorithm for this work is as follows:

Algorithm
Step 1: A User interface shall be created over cloud for adding the mobile id online, which is added after password authentication by the mobile user.
Step 2: Mobile application shall be created using android application development tool, which shall connect to the cloud database using SAAS application developed over the cloud.
Step 3: As the mobile app tries to communicate with the cloud application, it will require authenticating internally with the mobile id which was added by the user through web application.
Step 4: After authentication, mobile will communicate with the cloud application using encrypted data.
Step 5: For encryption of the mobile data poly alphabetic substitution cipher will be used which is faster and secure as require n26 permutations by the brute force attack **Step 6:** The work shall have following implementation modules:

1. Mobile App Module

1. Authentication
2. Encryption using Poly Alphabetic Substitution Cipher
3. Decryption using Poly Alphabetic Substitution Cipher

2. SAAS Layer Application Module

1. Web Interface for Mobile Users
2. Encryption using Poly Alphabetic Substitution Cipher
3. Decryption using Poly Alphabetic Substitution Cipher
4. Communication module with Mobile Application

Step 7: Poly Alphabetic Substitution Cipher requires O(n) complexity to encrypt or decrypt the data.

IV. CONCLUSION

This study introduced mobile cloud computing as the latest emerging technology. Besides there are several critical drawbacks in devices, which includes battery life time security issues etc. This research presents an

approach for improving the security and authenticity of mobile cloud computing in an android environment. In future, next step will be to improve the battery lifetime of devices, which is using mobile cloud computing.

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