Implementing Issues and Resolution of Cloud Computing in Android Devices

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***Abstract*: Android specially developed for the mobile and other devices. It makes the revolutionary changes in the technology. Near about 800 million people use android based devices. Android devices are portable and efficient to buy and carry. Android is apps based OS the users can do the works using the different type of app.**

Cloud computing is most popular technology that has taken the IT world day by day growing. Cloud computing is emerging as a new paradigm of large-scale distributed computing. It is a framework for enabling convenient, on-demand network access to a shared pool of computing resources. There are various layers to the Developing Android programming model that easily fit in with the creation of secure applications specially made for the cloud environment. The open source Android operating system allows complex cloud computing applications to run wherever the user is. Cloud can provide multiple apps for the user that provides the cloud service to the user any time anywhere.

In this paper, we discuss the implementing issues and resolution of cloud computing in android devices.

***Keywords* – Cloud computing, Android, SaaS, PaaS, Iaas, Devices, Application, Wireless Mobile technology, Multi-tenancy.**

I. INTRODUCTION

Cloud Computing had taken place over the Internet which is used to describe new classes of networks (utilities). It can concentrate on all its resources and manage it through software without intervenes and automatically. Cloud computing, in turn, refers to sharing resources, software, and information via a network, in this case the Internet. The information is stored on physical servers maintained and controlled by a cloud computing provider, such as Apple in regards to iCloud. As a user, you access your stored information on the cloud via the Internet.

The platform formed by the mobile or android application on server is known as Mobile Application Platform on Cloud Server. This platform or architecture handles both user data as well as user application in cloud server. This approach changes the application lifecycle as follows. "Write once, run everywhere. Install once, use everywhere."Android is an open-source mobile OS initiated by Google. The main reason to select Android as a server platform is that it is able to run not only for Smartphone but also for x86 processor.

A Multi-tenants application lets customers (tenants) share the same hardware resources, by offering them one shared application and database instance ,while allowing them to configure the application to fit their needs as if it runs on dedicated environment.Using a mobile OS would be more effective than using a desktop OS because the resource requirements of mobile OSs are smaller.

The number and variety of applications for mobile devices continue to grow. However, the resources on mobile devices including computation and storage do not keep pace with the growth. Incorporating the computation capacity on cloud servers into mobile computing has been desired. However, there are numbers of challenging issues to realize it.

II. CLOUD COMPUTING

In recently years, cloud computing had gone through various changes that had made it more usable for users and many others companies to stored their data. Various companies are using cloud services, like Windows Azure, Google Apps, Amazon. Different companies have different perspective, for example companies like IBM considers that cloud computing is a cutting edge of IT resources whereas on the other hand Google affirm that cloud computing is service based, paramount, commodious data depository application. The working principle of cloud computing is that it is a parallel and distributed processing model where IT acts as a service. The cloud computing structure consists of various clouds. This clouds are mainly computer servers where all the assets (information, application etc.) are collected together to form a centric data storage and data processing centre.

As the clients acknowledge the data request to the server, the request is being processed and finally searches results return. But, it is exigent to actualize the measurement and monitoring, to accomplish the quality of

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service and burgeoning of efficient resource allocation and efficiency of resource.

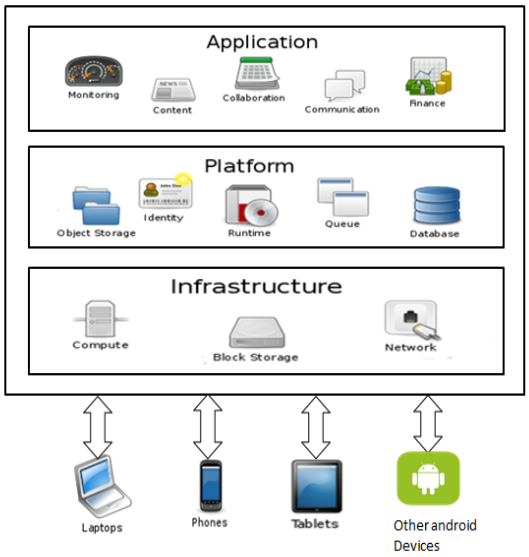

Fig 1. Cloud Computing

III. SAAS

Saas (Software as a service) is a cloud software distribution model in which the applications are hosted by a service provider which is made available for user over network through internet. The providers of SAAS are required to build information for operating system platform, hardware infrastructure and software.

The most popular cloud computing from others and easy to use is Software as a Service Cloud application services or "Software as a Service" (SaaS). Software as a Service uses internet to deliver the applications which is managed by service provider to client who accessed it through interface. SaaS applications do not required any download or installation. It can be run directly from a Web browser. With the help of SaaS, it's easy for enterprises to streamline their maintenance and support. Everything can be managed by vendors: applications, O/S, servers, storage, runtime, data, middleware, virtualization, and networking. Gmail is one famous example of a SaaS mail provider.

Fig 2. SaaS

IV. ANDROID OPERATING SYSTEM

Android is a stack of software like applications, operating system and middleware for mobile devices. Java programming is used for developing android application where all the necessary tools to develop the application are provided by Android SDK. It is an open source operating system based on Linux kernel and launched by Google. Mobile phone operating systems are constrained by their power dissipation, mobility conditions, hardware, storage space compared with the development of applications on PC, there are some different features of applications on mobile phone operating systems. It is also a layered system.

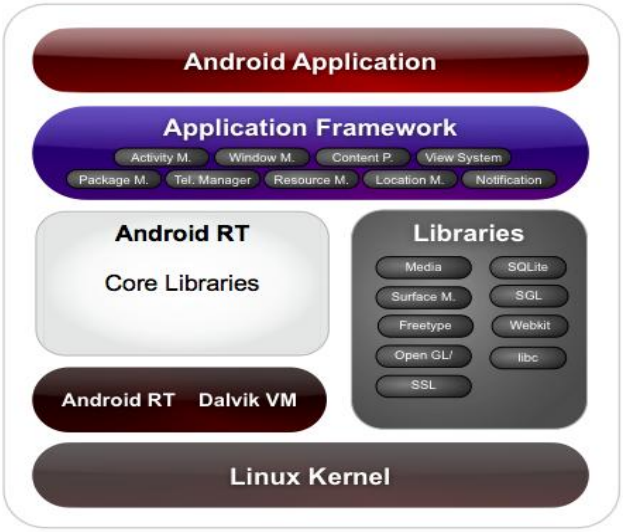

Fig 3. Android Application Layer

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V. ISSUES AND APPROACHES

The issues for implementing cloud computing in android devices are:

A. Low Bandwidth

Radio resources for wireless networks are not abundant as compared with wired networks. For this reason, bandwidth had become one of the issues in android devices while accessing cloud computing.

The solution for these issues is to share the limited bandwidth with the android users who are located in same area who are involved in the same content of application (e.g. video file) where users form a coalition in user each member is accessible for different part of file and later transmits it to other members in coalition.

However, the above solution is not for distribution policy because the members in coalition are not known who is going to receive which part of content and how much which leads to lack of fairness. So in that case, consider the data distribution policy which determines when and how much portions of available bandwidth are shared among users from which network (e.g. WiFi). It collects the all necessary information about user profiles (e.g. signal strength) periodically and creates decision tables by using Markov Decision Process (MDP) algorithm. Based on this table, the other user try to help the user to download the content that they cannot due to bandwidth limitation. There is a framework called RACE (Resource Aware Collaborative Execution) for maintaining user profiles.

B. Availability

Connection gets lost due to network failure, traffic congestion, out of signal, etc. and does create unavailability of service between android device and cloud.

The solution for disconnection from cloud to android users is to find the nodes so that they can be connected to the cloud by that node. This is discovery mechanism for detecting nearby nodes by Wi-Fi, WiMax, etc. so that it can link directly to cloud. These nodes are connected in ad hoc manner.

C. Heterogeneity

As we know that android devices are connected to cloud through network. But this network interfaces are not same at all the time. For example, android devices may be connected to cloud through GPRS and later it may be connected by WCDMA. Thus it follows the heterogeneity of network. So there arise an issue of how to handle the wireless connectivity while satisfying android requirements arises (e.g., always-on connectivity, on-demand scalability of wireless connectivity, and the energy efficiency of mobile devices).

There is an architecture that meets the application requirements to resolve this issue. This architecture is Context Management Architecture that acquires, manage and distribute the context information. It consists of three components name as context provider, context broker and context consumer as shown in fig. 5.

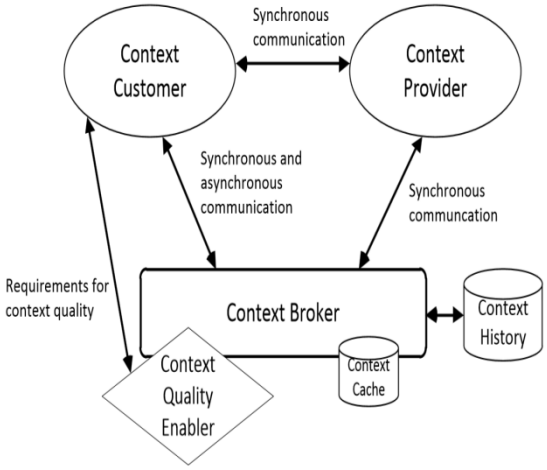

Fig. 4. Context management architecture

In this architecture, when a context consumer wants to communicate with a context provider, the context consumer will request the URI (Uniform Resource Identifier) of context providers at the context broker. Using this URI, the context consumer can communicate directly to the context provider and request the context data. Hence, this process increases the speed of context data delivery. Furthermore, when context quality enabler receives the requirement about the context quality from the context consumer, context quality enabler will filter out URIs of context providers that are not suitable with the required quality level. Therefore, this architecture enables controlling context quality according to the demands of the context consumers.

D. Computing Offloading

As almost 80% of world population is using android devices where they use many applications on it. As the result, the battery lifetime gets decrease by the use of application. Offloading is the feature of mobile cloud computing that improve the battery lifetime and lets to increase the performance of the applications. This technique is introduced with the scope to migrate the large computations and complex processing from resource-limited devices (i.e., mobile devices) to resourceful machines (i.e., servers in clouds). This avoids taking a long application execution time on mobile devices which results in large amount of power consumption.

Energy Efficient Computational Offloading Framework (EECOF) for the processing of intensive android applications. The framework focuses on leveraging application processing services of cloud datacenters with minimal instances of computationally intensive component migration at runtime. As a result, the size of data transmission and energy consumption cost is reduced in computational offloading for mobile cloud computing. Analysis of the results show that by employing EECOF the

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size of data transmission over the wireless network medium is reduced by 84 % and energy consumption cost is reduced by 69.9 % in offloading different components of the prototype application. Hence, EECOF provides an energy efficient application layer solution for computational offloading.

E. Enhancing the Efficiency of Data Access

The data resources on cloud become limited due to increase in demand of accessing data resources as number of services increase day to day life.

However, handling the data resources on clouds is not an easy problem due to the low bandwidth, mobility, and the limitation of resource capacity of android devices. Most of the I/O operations are handling by cloud server instead of android devices which leads to fast access of data from cloud.

There presents a solution which utilizes a memory capacity of mobile devices to increase the speed of data access, reduce latency and improve energy efficiency for the mobile devices. The idea of this solution is to build a Pocket Cloudlet based on non-volatile memory to store the specific parts or even full cloud services in the mobile devices. Using the Pocket Cloudlet clearly brings many benefits not only for users but also for service providers since this solution can increase access speed and reduce bottleneck of wireless link of cellular network. However, not all data can be stored on the mobile cache.

F. Security

Privacy: Every android device have GPS positioning which gives the current location based services from where the user is using its device. But this location based services leads to privacy issues. This problem becomes even worse if an adversary knows user's important information. Location trusted server (LTS) is presented to address this issue.

As shown in Fig. 5, after receiving mobile users requests, LTS gathers their location information in a certain area and cloaks the information called "cloaked region" to conceal user's information. The "cloaked region" is sent to LBS, so LBS know only general information about the users but cannot identify them. If LTS reveals users' information, or if LTS colludes with LBS, users' information will be in danger. Meanwhile, gathering the information of other users around the sender will be done on the cloud to reduce cost and improve speed and scalability. When launching the program on sender's mobile device, the program will require the cloud to provide information about surrounding users. After that, the mobile client will generate "cloaked region" by itself and send "cloaked region" to the LBS. In this way, both LTS and LBS cannot know the sender's information.

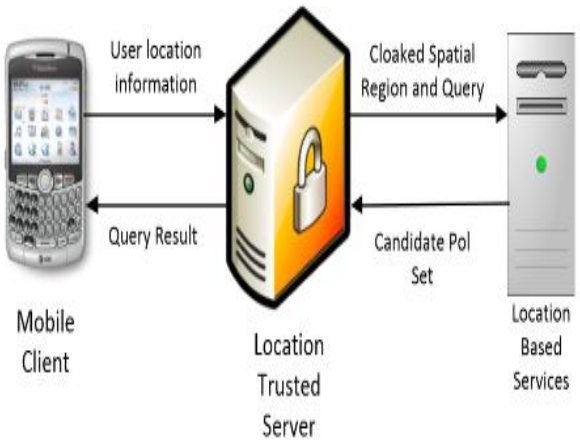

Fig 5. Architecture of Spatial Cloaking

Authentication: There presents an authentication method using cloud computing to secure the data access suitable for android mobile environments. This scheme combines TrustCube and implicit authentication to authenticate the mobile clients. TrustCube is a policy-based cloud authentication platform using the open standards, and it supports the integration of various authentication methods. An implicit authentication system using mobile data (e.g., calling logs, SMS messages, website accesses, and location) for existing mobile environment.

VI. CONCLUSION

Cloud computing has taken the IT world by storm. There are various layers to the Android programming model that easily fit in with the creation of secure applications specially made for the cloud environment. The open source Android operating system allows complex cloud computing applications to run wherever the user is.

Android developers can write applications to take advantage of the cloud and can leverage the faster time to market, the agility, cost benefits, etc. Most of the time, as users, we merely consider games and other apps that simplify daily life as the inspiration for Android apps. But make no mistake; enterprise apps are a good bet too.

The objective of this project is to address the issues of mobile computing in android devices.

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BIOGRAPHY

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