Advanced Technique for best use of CDroid OS for Mobile Cloud and Sharing

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ABSTRACT

CDroid is the next generation technology which will be used with clouds to get benefits from it. The twenty first century made us smart enough, it is now mandatory to save power consumption as much as for the sake of financial, environmental stability. It is equally important for national security and mankind. Today a huge number of populations in the world is worried about Smartphone batteries. They are huge consumer of energy when using several apps. Our system is to develop Cloud Computing with CDroid Operation System that is based on Fujitsu Server for Mobile Technology, which is completely used for saving energy, enhancing battery life and saving processor cycles more than ever of mobile phone, sharing data and faster access. The system shares both the memory of server and phone as well by using *offloading* mechanism. The mobile cloud computing concept helps several things to conserve power. The newest Fujitsu server provides world's fastest processing. We had described thoroughly the architecture of newly proposed system. This will be one more step towards the quickest changing cell phone technology. The hybrid cloud computing mobile technology for the next generation will be ready for our world within few years.

KEYPOINTS

Smartphone, CDroid, Fujitsu Server, Cloud Computing.

INTRODUCTION

The CDroid operating system in fujitsu server for mobile cloud [1] finds easy to save battery lifes of a Smartphone. They are already able to upload or download data, software, mainly Apps to and from server by offloading technique [2]. The Android OS is stored completely on the mobile phone device memory on which it runs and consumes power. Our proposed system is to use a CDroid OS in Fujitsu server to best serve cloud computing facility. The system stores, executes in the cloud utilizes electricity at IaaS cloud location. As we know the current growth rate of battery capacity is just 5% per year (Robinson et al) [3], which is very less according to growing market needs. The Fujitsu server is fastest as because it transfers data between CPU and memory in a way which is best in the world. The energy consuming Apps are installed partly on clouds, so a lot of electricity is saved and enhances battery life.

Throughout this paper we will use several diagrams and figures to make others understand about our proposed system.

THE PROPOSED SYSTEM

The system need the cloud services (IaaS), where the Fujitsu server is being installed. Smartphones using wi-fi and 3G enabled network connectivity is best for the system. They communicate the server cloud through mobile tower. The phone also needs CDroid OS. The problems and solutions to achieve the goal using our system both will be discussed later in this paper. The basic structure for the proposed system is as follows:

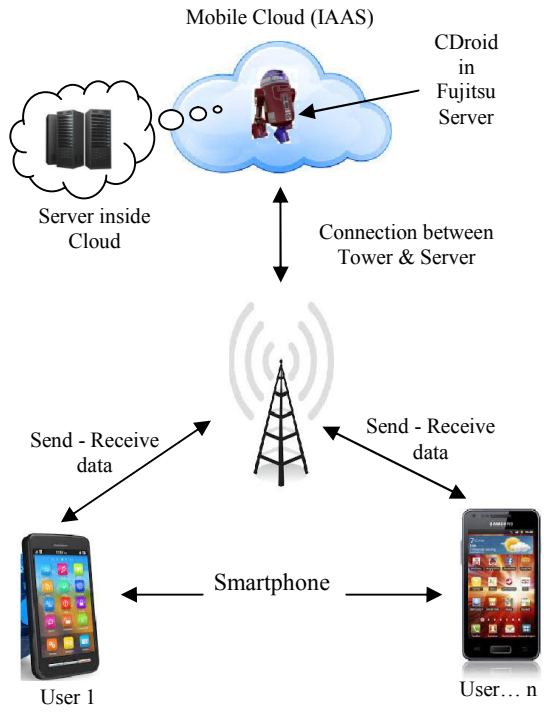

Figure 1: Proposed System Architecture (Basic).

The above diagram (Figure 1) tells us about the basic idea about the smartphones connecting with fujitsu server at clouds provided at cloud systems with the help of communication system like mobile tower. There are lots of

intermediate devices and protocols are there, we will discuss them later on this paper.

CLOUD COMPUTING

Mobile Cloud Computing (MCC) is the greatest factor to reduce power consumption on the mobile devices [4].
Cloud services are internet-service-oriented computing concept, where Hardware, Software and data are shared. The proper definition may be "Share and use of applications and resources of a network environment to get work done without concern about ownership and management of the resources and applications"- (M-S. E Scale, 2009) [5]. It is also a combination of preexisting technology, which gives some services. The two different models used in cloud computing are Deployment model and Service model.
The service models are of three types Software as a Service (SaaS), Platform as a Service (PaaS), and Cloud Infrastructure as a Service (IaaS).
They follow NIST (National Institute of Standards and Technology) model [6]. We will concentrate on the IaaS part for our proposed system.
The essential characteristics of cloud computing are
On-demand services, Broad network access, Resource pooling, rapid elasticity, measured service, self provisioned, pay per use (lower cost), scalability, ease of utilization, quality of service, reliability, outsourcing, simplified maintenance and upgrade, low barrier to energy etc.
"Mobile Cloud Computing (MCC) at its simplest refers to an infrastructure where both the data storage and the data processing happen outside of the mobile device. Mobile cloud applications move the computing power and data storage away from mobile phones and into the cloud, bringing applications and mobile computing to not just Smartphone users but a much broader range of mobile subscribers" [7][8].
As processing task is not done by the mobile device the power and memory consumption is also less in this area and eventually the mobile device became very fast.
For sake of our proposed system Cloud Infrastructure as a Service (IaaS) will be used to store the mobile phones data, Apps etc in the form of Second code segment or CDroid Server. As the system uses cloud services, it does not depend on geographical locations. To reduce cost the cloud infrastructure including fujitsu server must be placed in a country where electricity cost is lowest [9].

PROBLEMS WITH ANDROID

Android systems hanged a lot, as lots of processes runs on the background. This causes another big problem i.e. drainage of battery. After removing the cover we had seen the Smartphones are heated badly, again for the same reason. Lastly, the malware applications [10] cause problems when downloading anything from google play [11] or elsewhere.

CDROID

CDroid is an IaaS cloud-integrated mobile operating system; they can be used in Smartphones (e.g. Android). To enhance speed and increased battery life of mobile phone (Smartphone) the CDroid system is being introduced. It is a system which has two different segments. The first code segment which is named CDroid device here occupies its place within the Smartphone and second one is mentioned by CDroid server that inhabited inside the clouds (private/public) [12].
Some CDroid prototype uses the logo as shown in Figure 2.

FIRST CODE SEGMENT/ CDROID DEVICE

This part will handle all the operations done by the Smartphone like calling, SMS/ MMS, internet access, App management etc. and maintain all those using log files. The CDroid device sends all the collected data and information to the cloud side CDroid server as shown in the picture. This process is completely a piggybacking method.

SECOND CODE SEGMENT/ CDROID SERVER

This is the cloud-side of the system which handles a reliable connection with CDroid device, optimizes the user traffic cashing and pre-fetching and content compression. The security issues like uses of different apps, anti-phishing programs, cookie handlers, sensitive information blocker, remote wiper etc. It protects the user's privacy as mobile ad blocker; push notification handler is being used. They also handle mobile computation offloading and data backup synchronization handler, remote code executor [13] for better mobile user access.

Figure 2: A CDroid Logo.

WORKING STRATEGY

CDroid part inside the Smartphone is the operative load environment within it, which works with the other part installed in the clouds as IaaS. The cloud service provider itself is responsible for all synchronization, communication with the Smartphone. So a lot of work is reduced by the Smartphone and it become faster with enhanced battery life. The rest of the parts are already installed in the Smartphone to communicate with the cloud. We assume the internet connection is on when this system works. A set of userid and password is provided to every Smartphone connected with the cloud network.
CDroid tools are used in Android based mobile phones to switch off/on wi-fi, Bluetooth, data service. There are some free Apps found in google play.

SOLUTION WITH CDROID

CDroid systems First code segment is on cloud, so a number background a process executes over the cloud server. It solves several problems like hanging of a cell phone system, saves the energy that was supposed to consume from phone battery. The heat problem of mobile hardware is also solved in this way. The cloud providers use several anti-malware applications, solves the problems when downloading anything from Google play or somewhere else.

FUJITSU SERVER

High speed interconnecting facility equipped with local disk or as a system with built-in capabilities. Fujitsu server system prototype we are using in the cloud because of high geared speed and flexibility measured so far in simultaneous application. This has been tested and proved that the hardware prototype performs four times more than non-disk pool system. The I/O throughput is increased at about 40% when running actual applications.
Here system performance is measured in every pico second. The next generation server which is using Resource pool architecture (described in the figure 3) [14].

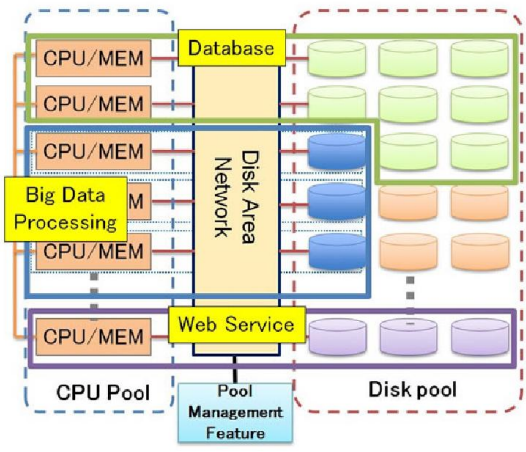

Figure 3: Advanced Resource Pool Architecture.

Pooling or arranging of µ-processors, hard disk drives (HDDs) are done for high performance, high utilization and serviceability [15][16]. Figure 3 describes how resource pool works. The above resources are for processing and storing of huge data inside a cloud performs faster and quicker. Other hardware components that comprise the ICT (Information and Communication Technology) infrastructure, and connecting these resources together using high-speed interconnects, high storage capabilities are also needed. The ICT infrastructure developed at its maximum (nearly 86% from 2001 and 2011) globally [17]. In the prototype version, the CPU/HDD interconnects ran at a speed of 6 Gbps [18] without any mutual interference.
As the data transfer rate of this server is very high, that's why it can handle variety of services. Those are the reason behind proposing fujitsu server for the cloud server. There are big numbers of servers with storage devices are interconnected to provide cloud services in data centers of a cloud provider. Developing ICT infrastructure for Batch compute server, Application on database server, Turning on applications in phases, Complex timesharing server, Workloads that change seasonally, Real-time applications, System utilization etc [19] need high I/O performance or large-scale data processing tasks that use the local disks of servers, as well as for other services requiring a level of performance that had been difficult to satisfy with configurations geared toward traditional cloud systems.
Specification
The system uses a resolution of 600X800 pixels speed of 400MHz. here storage is not specific; it depends upon the cloud service provider companies business needs, according to that the HDD pool is created and maintained. Microsoft CE operating system with remote application enabled.
The networking is done between servers by using Infrared, Bluetooth and wireless LAN as it is required.
Features of the newly developed technology are as follows:

POOL MANAGEMENT FEATURE

In accordance with user requirements for CPUs, HDDs and other needs, the pool management feature allows for necessary resources to be allocated from the pool, the deployment of OS and middleware resources, and the on-demand provision of servers in a required configuration.
Middleware that offers storage function using servers apportioned from pool. Using server resources from the pool, storage capabilities are delivered by configuring the middleware, which controls HDD management and data management functions. Whether it is a server with multiple local disks tailored for large-scale data processing tasks, or RAID functions for improved data reliability, the system can be flexibly configured to meet performance and power consumption requirements.
High-speed interconnect technology that connects the disk pool comprised of multiple HDDs is connected to the CPU pool via a high-speed interconnect disk area network. The HDDs linked to the CPUs through the disk area network have the same disk access capabilities as the local disks in a typical server, and their performance is not affected by other CPUs. A disk area network was created using prototype interconnects.

Fujitsu cloud services which provide a fully flexible model for IT infrastructure, platforms and applications, allowing companies to match technology systems and costs directly to changing business needs [20].

COMMUNICATION STRATEGY

The Smartphone through the Sorting Client Application (SCA) sends the input file to the nearest access-point. From the access point, the packet gets routed to the service provider edge routers. After edge routers, the packet gets routed to the core routers behind the internet backbone and then to the data centers. The power consumption of switches has been excluded as this has not relevance with our topic. In most cases there will be only a few number of them and their power consumption in insignificant when considered [21].

Figure 5 depicts how CDroid device components inside Smartphone have some sort of basic Smartphone applications; the device collects information about some user activities and behavior like phone calls, sms send and receiver information, GPS co-ordinates etc. The information (may include voice too) then send to the cloud side of the proposed system as a piggyback to the user traffic.

Application Framework, Libraries, Android Runtime, Kernel is used to communicate with the Smartphone hardware.

The application framework of CDroid device includes IEEE 802.11 standard for WLAN which uses Enhanced Data GSM Environment (EDGE). We use EDGE protocol that is several times faster (around 236 Kbit/s or more) than the primeval General Packet Radio Services (GPRS) speed at about 56Kbit/s based on wireless fidelity.

The digital transmission method includes 3G cell phone network protocols like Universal Mobile Telecommunication Service (UMTS), Wideband Code-Division Multiple Access (WCDMA), High-Speed Downlink Packet Access (HSDPA) [22], and Evolution Data Maximized (EV-DO) with Data and voice (EV-DV) too. These technologies provide a maximum data transfer speeds of up to 3 Mbps. it is easy to browse full-fledged Web pages, watch streaming video, tune into live TV or on-demand video programming, make large in seconds, play 3D games, & much more. IP connectivity of this technology is packet based.

A city or village is divided into several cells; each cell is typically sized at about 10 square miles (26 square kilometers) i.e. the range of one mobile tower. Cells are normally thought of as hexagons on a big hexagonal grid. Each cell has a base station that consists of a tower and a small building containing the radio equipment. Base stations are often called masts, towers or cell-sites; they follow the concept of mesh topology.

The data transmission of a Smartphone is between 0.6 watts to 3 watts; which is lesser than Citizen Band Radios. The two non-adjacent cells can reuse the same frequency. They fulfill the two requirements, first the frequency will remain within the cell and secondly the saving of phone batteries.

All Base Station (BS) within a cluster (A group of adjacent cells) are connected to a Mobile Switching Centre (MSC) using land lines. Each MSC of a cluster is then connected to the MSC of other clusters and a Public Switched Telephone Network (PSTN) main switching centre.

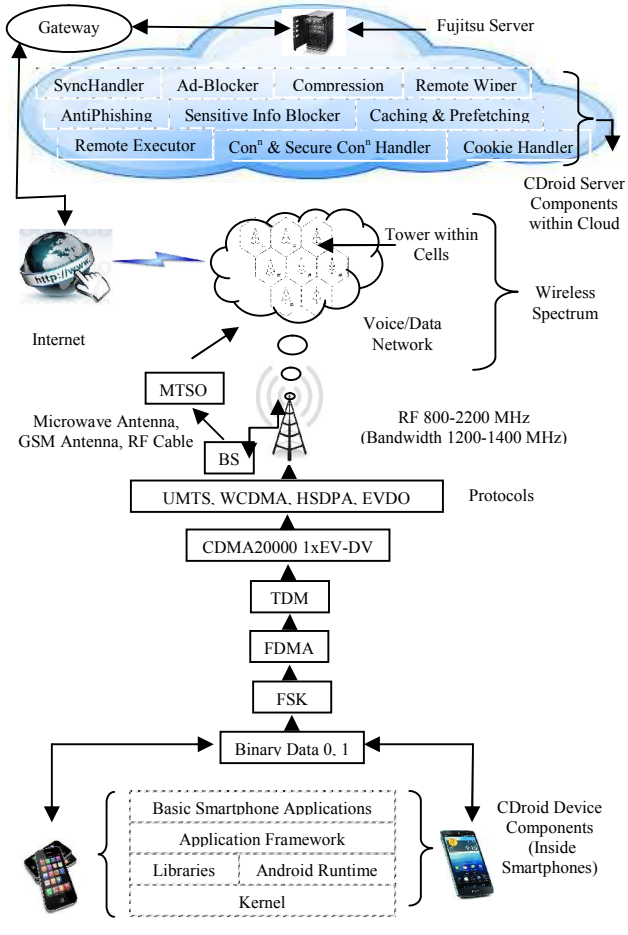

Figure 5: Advanced System Architecture.

The MSC stores information about the subscribers located within the cluster and is responsible for directing calls to them. Each carrier in each city also runs one central office called the Mobile Telephone Switching Office (MTSO). This office handles all of the phone connections to the normal land-based phone system, and controls all of the base stations in the region. The Components of the base station include transceivers, which enable the transmission and reception of radio signals through the antennas, plus signal amplifiers, combiners, and a system controller.

A Smartphone deals on digital data (the voice is also converted into binary i.e. 0 and 1.)Frequency Shift Keying (FSK) uses two frequencies, one for 1s and the other for 0s, alternating rapidly between the two to send digital information between the cell tower and the phone. The CDroid device using Frequency Division Multiple Access (FDMA) puts all the binary data (including voice) on a separate frequency. The frequency of cell phones, cordless phones, and cell phone tower signals ranges between 800 and 2200 MHz. The frequency it considers is Radio Frequency. Cell phone technology combines the two great

technologies named traditional telephone and old radio technology [23].

The wireless spectrum which is a limited resource used by cell phones can communicate on 1,664 channels or more. In addition, cell phones Time Division Multiple Access (TDMA) use a dual band. It assigns each call a certain portion of time on a designated frequency. This means that it can operate in between 800 MHz to 1900 MHz (or around 2.2 GHz) bands. Clearly the bandwidth, a cell phone uses is 1100-1200 MHz.

CDroid Server Components within cloud contains connection handler (secure) that handles the connection with CDroid device to optimize users traffic caching & pre-fetching; content compression is also done here. The security issues must contain app, anti-phishing, cookie handler, sensitive information blocker, push notification handler and remote wiper. Mobile advertisement blocker, push notification handler protects users' privacy. Synchronization handler, remote code executor handles mobiles computations and loading the data backup.

Code Division Multiple Accesses (CDMA) [24] gives a unique code to each call and spread it over the available frequencies. Here we will use CDMA2000, which is of three types namely CDMA2000 1x, CDMA2000 1xEV-DO (First Evolution Data Optimized) and CDMA2000 1xEV-DV (First Evolution Data and Voice). For our case it better to use CDMA2000 1xEV-DV where the forward link it supports is 3.08 Mbps and a reverse link nearly 1 Mbps [25]. The Cloud Radio Access Network (RAN) will be use by the proposed system.

Fujitsu's Business Smartphone F-04F can provide 3 days of battery life, but using the above architecture, it can be extended up to 6 days which is quite surprising in Smartphone produced nowadays.

UPLOADING

Uploading is necessary for sharing of data or software. The CDroid Operating system must be uploaded into some cloud provider. We have used box.com for uploading of our said OS by creating a simple userid and password. It provides us 10 GB free space. The OS can be downloaded from anywhere in the world by accessing box.com users. The same can be done with cloud service providers like google, amazon etc.

CONCLUSION

It also saves memory spaces as a part of different apps shares cloud server. Also the fastest service should be provided by the system. The proposed system will be beneficial for the cloud computing service providers like Amazon web services, Rackspace, CenturyLink/Savvis, Salesforce.com, Verizon/Terremark, Joyent, Microsoft, Google, IBM, Sales force etc. It will increase their business volume and quality of service. This theoretical approach can be making a practical one if we get proper guidance and funding for welfare of humankind. Also we do believe the free operating system can make lower the Smartphone prices and available to all in developing nations worldwide.

LIMITATION

The proposed system needs high speed internet connectivity, which is another cons found in Android based phones; failure of this could stop the Apps in a Smartphone. The 4G technology is also available and that can provide the better result.

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