Transfigure Disburden Android Application Using Cloud

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Abstract: Smart phone is a compelling platform for a wide spectrum of applications, ranging from web browsers and games, to navigation and personal health applications, and much more. However, the potential of these mobile applications are still constrained by the computation resources of a smart phone such as CPU, memory storage, battery and energy capacity, which are limited in comparison with PCs. Smartphone are quickly becoming the primary mean for Internet access. In this paper a framework that automatically offloads heavy back-end tasks of a regular standalone Android application to an Android virtual machine in the cloud is proposed. This framework can be deployed in the application layer without modifying the underlying Android platform. The proposed framework design utilizes the Android architecture, which separates an application into activity (front-end user interactions) and service (back-end tasks). This separation yields a natural granularity for task offloading. It also utilize Android's AIDL (Android Interface Definition Language), which is used to assist an activity to invoke methods in a service, in a way that redirects invocations from an activity to an identical service that runs in a remote server. This allows the users to achieve offloading without modifying application source code and Android OS in each Android device. To explore the design of an offloading framework that enables an Android device to offload resource intensive work to a remote server has been achieved through our proposed method.

Keywords-smartphone; android; cloud; cyber foragin

1. INTRODUCTION

1.1 Mobile computing-overview

Mobile computing is associated with mobility of hardware, data and software in Computer applications. Mobile computing has become possible with convergence of mobile communications and computer technologies, which include mobile phones, personal digital assistants (PDA), handheld and portable computers, wireless local area networks (WLAN), wireless wide area networks and wireless ATMs. The increasing miniaturization of virtually all system components is making mobile computing a reality (Alonso and Korth, 1993; Forman and Saharan, 1994 [1]). Mobile computing in the use of a portable computer capable of wireless networking - is already revolutionizing the way we use computers.

1.1.1 Mobile computing services

The ability to share information across a wireless platform is becoming more vital to the today's business communication needs. ZSL has extensive expertise in wireless application development, having designed and developed several wireless applications and solutions for Blackberry, iPhone, Google Android G1, iPad, Windows Mobile, Symbian, Brew devices, PDA, Palm & Pocket PC.

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Mobile Computing Services allows mobile workforce to access a full range of corporate services and information from anywhere, at any time and it improves the productivity of a mobile workforce by connecting them to corporate information systems and by automating paper-based processes.

1.1.2 Benefits of mobile computing

There has never been a better time to put mobile computing to work for any organization. Just as cell phones have become a necessity for mobile professionals, access to data is quickly becoming a critical element in today's competitive market. Wireless telecommunication vendors now offer cost effective ways to provide high speed connections from the client's office or the front seat of a vehicle [6].

a. Improved decision making

Mobile Computing offers to conduct business at the point of activity. The ability to collect, access and evaluate critical business information quickly and accurately for decision making that can have a far-reaching effect on any company's ability to compete successfully.

b. Increased productivity and reduced costs

Mobile computing can lead to increased individual productivity, increased sales per sales person, more service calls per repair person, less time spent by professionals on administrative work, and much more— all of which ultimately translates into higher sales at lower cost. And, on-the-spot invoice production in service vehicles can lead to shorter payment cycles and better cash flow.

c. Improved customer relations

The success of a business can often be measured by its ability to satisfy customers. Mobile computers gives the field worker the ability to answer customer questions, check order status and provide other services anytime their customers need them from wherever they happen to be. Cost Effectiveness Paybacks for mobile computing investments can often be measured in months. For example, look at a typical service technician. With mobile computing it is very common to save an hour or more per day by simply eliminating the need to go to the office in the morning or return in the evening. Assuming that a technician bills out at $85 per hour you would be able to increase monthly revenues by approximately $1870 per month (22 days x $85 per hour). This same math would apply to a sales force. To outfit a mobile sales professional with a computer, modem, and software would require an initial investment of around $4,000. Real world experience has demonstrated savings of 20-40 hours per month per salesperson. If this time is used to get in front of more prospects or provide better service to existing clients it could have an enormous impact on your bottom line.

1.2 Smart phones-overview

Smart Phones are advanced phones with computer-like functionality such as the ability to browse the internet. While 80% of US adults have a cell phone, only about 4% of those phones are smart phones, although the number of smart phones has grown rapidly since 2005 [3]. Smart phone adoption in the U.S. has lagged that of other developed areas, such as Japan or Europe, where consumer demand for cutting edge technology and better telecommunications infrastructure have spurred adoption. However, as corporate America has seen the advantage of supplying workers with 24/7 office email, and consumers have gravitated towards the rich media offered by Apple (AAPL) iPhones, the North American smart phone market is picking up.

A Smartphone is a mobile phone built on a mobile operating system, with more advanced computing capability and connectivity than a feature phone. The first smart phones combined the functions of a personal digital assistant (PDA) with a mobile phone. Later models added the functionality of portable media players, low-end compact digital cameras, pocket video cameras, and GPS navigation units to form one multi-use device. Many modern smart phones also include high-resolution touch screens and web browsers that display standard web pages as well as mobile-optimized sites. High-speed data access is provided by Wi-Fi and mobile broadband. In recent years, the rapid development of mobile application markets and of mobile commerce has been drivers of Smartphone adoption.

1.3 Cloud computing-overview

Cloud computing is an expression used to describe a variety of different types of computing concepts that involve a large number of computers connected through a real-time communication network such as the Internet. Cloud computing is a term without a commonly accepted unequivocal scientific or technical definition. In science, cloud computing is a synonym for distributed computing over a network and means the ability to run a program on many connected computers at the same time. The phrase is also more commonly used to refer to network-based services which appear to be provided by real server hardware, which in fact is served up by virtual hardware, simulated by software running on one or more real machines [2]. Such virtual servers do not physically exist and can therefore be moved around and scaled up (or down) on the fly without affecting the end user arguably, rather like a cloud.

1.4 Android-overview

Android is a Linux-based operating system for mobile devices such a smart phones and tablet computers. It is developed by the Open Handset Alliance led by Google Android was built from the ground-up to enable developers to create compelling mobile applications that take full advantage of all a handset has to offer. It was built to be truly open [8]. For example, an application can call upon any of the phone's core functionality such as making calls, sending text messages, or using the camera, allowing developers to create richer and more cohesive experiences for users.

These factors have contributed towards making Android the world's most widely used Smartphone platform, overtaking Symbian in the fourth quarter of 2010 and the software of choice for technology companies who require a low-cost, customizable, lightweight operating system for high tech devices without developing one from scratch.

The BlackBerry and iPhone, which have appealing and high-volume mobile platforms, are addressing opposite ends of a spectrum. The BlackBerry is rock-solid for the enterprise business user. For a consumer device, it's hard to compete with the iPhone for ease of use and the "cool factor." Android, a young and yet-unproven platform, has the potential to play at both ends of the mobile-phone spectrum and perhaps even bridge the gulf between work and play.

Android has a large community of developers writing applications ("apps") that extend the functionality of the devices. Developers write primarily in a customized version of Java. Android's kernel is based on the Linux kernel and has further architecture changes by Google outside the typical Linux kernel development cycle. Android does not have a nativeX Window System nor does it support the full set of standard GNU libraries, and this makes it difficult to port existing Linux applications or libraries to Android.

Android's share of the global smart phone market, led by Samsung products, was 64% in March 2013 [5]. The operating system's success has made it a target for patent litigation as part of the so-called "Smartphone" between technology companies. As of May 2013, 48 billion apps have been installed from the Google Play store, and as of September 3, 2013, 1 billion Android devices have been activated.

2. RELATED WORK

2.1 Analysis Of Related Work

To better understand of searching in multi keyword, it is useful to review and examine the existing research works in literature. Therefore, recent approaches and methodologies used for searching have been discussed.

R .K. Balan, D. Gergle, (2007) [4],Cyber foraging is the transient and opportunistic use of computer servers by mobile devices. The short market life of such devices makes rapid modification of applications for remote execution an important problem. Its describe a solution that combines a "little language" for cyber foraging with an adaptive runtime system. It report results from a user study showing that even novice developers are able to successfully modify large, unfamiliar applications in just a few hours. It also shows that the quality of novice-modified and expert-modified applications is comparable in most cases.

N. Palmer, R. Kemp, T. Kielmann, and H. Bal, (2009) [11],Mobility is an increasingly important part of today's computing landscape. There is currently an incredible growth in the deployment of "Smartphone" devices, mobile computers with a variety of networking and sensor technologies. In addition, the growth of wireless networks such as Wi-Fi has un gathered users from the wall bringing mobility to traditional laptop computers. The challenges that the mobility of these devices create for networked computing are analogous to many of the problems faced in the area of Grid Computing. We outline parallel challenges in these two areas and argue that solutions to the problems in the Grid Computing space are applicable to the problems faced by these new platforms.

The Ibis platform, developed to address challenges in the area of Grid Computing, is ideally suited for building distributed applications for mobile devices and details our work to bring Ibis to the Android Smartphone platform. It demonstrate that the use of this system gives mobile devices the computing power of the Grid, integrating the two areas and solving issues with limited compute power on mobile devices. It also explain how Ibis provides a unique API for building distributed applications on mobile devices enabling truly distributed computing on this new platform.

E. Y. Chen, M. Itoh (2010) [7],The number of Smartphone users and mobile application offerings are growing rapidly. A Smartphone is often expected to offer PC-like functionality. In this paper, It present Virtual Smartphone over IP system that allows users to create virtual Smartphone images in the mobile cloud and to customize each image to meet different needs. Users can easily and freely tap into the power of the data center by installing the desired mobile applications remotely in one of these images. Because the mobile applications are controlled remotely, they are not constrained by the limit of processing power, memory and battery life of a physical Smartphone.

K. Kumar and Yung-Hsiang Lu (2010) [9],Cloud computing is a new type of service provided through the Internet. In cloud computing, the computing resources such as processor, memory, and storage are not physically present at the users' location. Instead, the computing resources are owned and managed by a service provider and the users access the resources via the Internet. For example, Amazon offers Elastic Compute Cloud and Simple Storage Service; personal data can be stored on their cloud using S3 and computation can be performed on the stored data using EC2.

This type of computing paradigm provides many advantages for businesses, including low initial capital investment, shorter start-up time for new services, lower maintenance and operation cost, higher utilization through virtualization, and easier disaster recovery. Such advantages make cloud computing an attractive option. Some reports suggest that there are only benefits in shifting computing from desktops to the cloud. How about cloud computing for mobile users? The primary constraints for mobile computing are limited energy and wireless bandwidth. In this article, we investigate how cloud computing may provide energy savings as a service to mobile users and describe challenges and possible solutions.

R. K. Ma, King Tin Lam (2010) [10],Cloud computing is all the rage these days; its confluence with mobile computing would bring an even more pervasive influence. Clouds per see are elastic computing infrastructure where mobile applications can offload or draw tasks in an on-demand push-pull manner. Lightweight and portable task migration support enabling better resource utilization and data access locality is the key for success of mobile cloud computing. Existing ask migration mechanisms are however too coarse-grained and costly, offsetting the benefits from migration and hampering flexible task partitioning among the mobile and cloud resources.

In propose a new computation migration technique called stack-on-demand (SOD) that exports partial execution states of a stack machine to achieve agile mobility, easing into small-capacity devices and flexible distributed execution in a multi-domain workflow style. Our design also couples SOD with a novel object faulting technique for efficient access to remote objects. Implement the SOD concept into a middleware system for transparent execution migration of Java programs. It is shown that SOD migration cost is pretty low, comparing to several existing migration mechanisms. It also conduct experiments with an iPhone handset to demonstrate the elasticity of SOD by which server-side heavyweight processes can run adaptively on the cell phone.

3. METHODOLOGY

3.1 Implement off loadable Components as Services.

The Android architecture defines four types of application components on Android: activities, services, content providers and broadcast receivers. The first two types of components are of the most importance in the light of this proposed framework. An activity represents a single screen of user interface while a service runs in the background. The proposed framework requires developers to apply the Model-view-controller (MVC) design pattern explicitly and rigorously to isolate the application logic from the user interface. In particular, this framework assumes that developers always implement compute-intensive tasks as services and front-end user interactions as activities. This is a fair assumption as it is encouraged and supported by the Android architecture. It is assumed that the activity and the service run in two different processes. They can, however, reside in the same or different application package files (APK).

3.2 AIDL-(Android Interface Definition Language)

There are many ways to achieve Inter-process Communication (IPC) between an activity and a service on Android. A common approach is late run-time binding by passing a special type of messages called intents. While intent messaging is easy to implement for simple operations, it is not suitable for a service that provides multiple operations. The resulting code of such a service and the calling activity can be complex and error-prone as the developer has to meticulously handle the parameters associated with each message passing. This framework requires the use of AIDL (Android Interface Definition Language-Fig 1) to achieve IPC between an activity and a service. AIDL is a built-in mechanism of Android that avoids the disadvantages with intents. It is used to define programming interface between an activity and a service on Android. It simplifies the task of decomposing objects into primitives understandable by the OS and marshalling the objects across different processes.

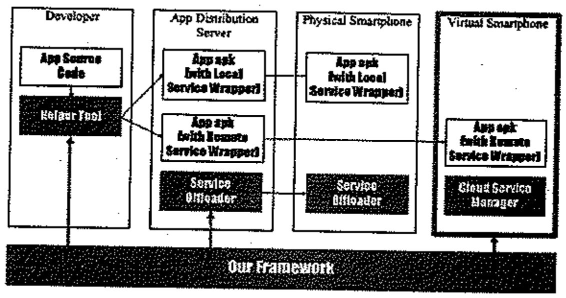

Figure 1: AIDL-framework

3.3 Layers of cloud computing

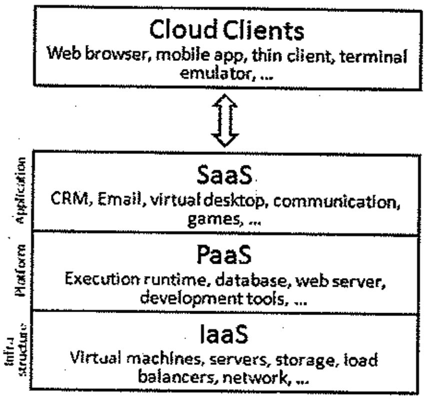

Figure 2:Layers of cloud computing

There are three types of cloud computing Services:

- Software as a Service (SaaS)
- Platform as a Service (PaaS)
- Infrastructure as a service (IaaS)

Most of the current clouds are built on top of modern data centers. It incorporates Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS), and provides these services like utilities, so the end users are billed by how much they used. Figure 2 shows a layers of cloud computing.

Cloud Clients: This is the foundation of cloud computing which provides the hardware the clouds run on. Data centers are usually built in less populated areas with cheaper energy rate and lower probability of natural disasters. Modern data centers usually consist of thousands of inter-connected servers.

Infrastructure as a Service: Built on top of data centers layer,IaaS layer virtualizes computing power, storage and network connectivity of the data centers, and offers it as provisioned services to consumers. Users can scale up and down these computing resources on demand dynamically. Typically,multiple tenants coexist on the same infrastructure resources [12].

Platform as a Service: PaaS, often referred as cloud ware, provides a development platform with a set of services to assist application design, development, testing, deployment, monitoring, hosting on the cloud. It usually requires no software download or installation, and supports geographically distributed teams to work on projects collaboratively. Google App Engine, Microsoft Azure, Amazon Map Reduce/Simple Storage Service are among examples of this layer.

Software as a Service: In SaaS, Software is presented to the end users as services on demand, usually in a browser. It saves the users from the troubles of software deployment and maintenance. The software is often shared by multiple tenants, automatically updated from the clouds, and no additional license needs to be purchased. Features can be requested on demand, and are rolled out more frequently. Because of its service characteristics, SaaS can often be easily integrated with other mashup applications.

4. EXPERIMENTS AND

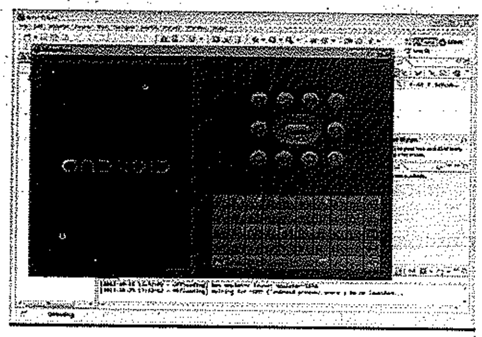

Figure 3: Android Page Is Loading

In this above screen shot it shows the emulator launching in the system. It is used to search the offloading process and to search the web sites.

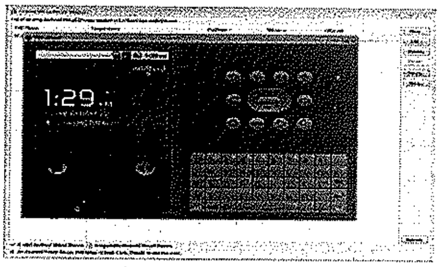

Figure 4: Home Page of the Emulator

In this above screen shots it shows the home page of the emulator and want to swap this page to access the process. After giving the name and password the user can login the page. It is used to enter the new user to set the user name, password, E-mail id and age to register new account. Once a new user login detail has been created, it can be used to directly switch to a particular task. Here the images or web sites are passed through the cloud and it can be accessed in the cloud. Finally when the offload option is clicked, the image is displayed in the mobile.

5. CONCLUSION

In this paper, an offloading framework that enables an Android device to offload resource intensive work to a remote server in the datacenter is proposed. The design decisions are driven by the intention to deploy the framework in the application layer without modifying the underlying Android platform and the application source code. Android separates an application into activity (front-end user interactions) and service (back-end tasks). This separation yields a natural granularity for task offloading. This framework also utilize Android's AIDL (Android Interface Definition Language), which is used to assist an activity to invoke methods in a service, in a way that redirects invocations from an activity to an identical service that runs in a remote server. This allows the users to achieve offloading without modifying application source code and Android OS in each Android device.

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