A Review For Improving Synchronization Between Clone And Mobile Device In Mobile Cloud Computing

Yash Dave
Information and Technology dept.
Parul Inst. Of Engg. & Tech.

Gordhan Jethava
HOD- Information and Technology dept
Parul Inst. Of Engg. & Tech.

Abstract

The goal of cloud computing is usage of cloud resource form anywhere i.e. mobility. Mobile cloud computing, new technology in the field of cloud computing enables cloud users to access cloud from their mobile devices (e.g. Laptops, PDA, Smartphone's). Computation power and battery life is one of the major issues of these mobile devices. Now a day's resource starved applications like online HD graphics games, multimedia, etc. needs more bandwidth and computation power that mobile device might not have. So to overcome this problem clones of mobile devices are created on cloud servers. This clone uses resources of the cloud servers. Using augmented execution all complex applications run in this clone and response is sent back to mobile device. This can save battery life for low configured mobile devices. This paper shows how to improve the synchronization between mobile device and clone to communicate more reliably in terms of improving security.

Keywords

Cloud computing, mobile cloud computing, clone, augmented execution, and authentication.

1 Introduction

Cloud computing provides models that provides resources like computing power, memory, bandwidth, etc. as a service to cloud subscribers. There are lot many cloud providers in the market e.g. Google, Amazon, SalesForce.com etc. This model enables cloud users to subscribe their required business applications which are available for all time existed on cloud. It is easy to handle such these applications and it needs very little care to maintain providing advantage that your computer and mobile device are sync all the time. Cloud users can have all personal data on their hand at any point of time. Cloud also enables user to deal their data in any form without worrying about the data loss. Also now a day people are opting for pervasive computing because mobile applications are growing very quickly as they can do all the stuff they wanted to be on hand. Up till now the technology has remodeled many times. Also mobile device has high speed connectivity with high configured machines like laptops and personal computers to commercial cloud. Applications are deployed on the server and response is sent back to the server. Also there are lot many mobile browsers available thanks to Opera, Google and Apple that motivates cloud users to use the cloud space from their mobile devices such as laptops, palmtops and smart phones. Also this motivates mobile developers to develop their application that can be hosted on cloud [1]. This is why now mobile apps are being developed that will be connected to cloud all the time.

1.1 Why mobile Cloud computing?

Unlike the cloud computing which offers the freedom to use applications which are hosted on cloud through wired connection, mobile cloud targets at the services available through mobile network providers (MNP like Vodaphone, AirTel). Think about those apps we can run our smart phones like online bill payment, online recharge your mobile balance, railway inquiry, GPS systems, gaming etc. This attracts mobile users to switch on to subscribe mobile cloud.

1.2 Reasons for opting cloud development

1.2.1 Cost Effectiveness: Cloud computing is probably the most cost efficient method to use, maintain and upgrade [8]. Traditional desktop software costs companies a lot in terms of finance. Adding up the licensing fees for multiple users can prove to be very expensive for the establishment concerned. The cloud, on the other hand, is available at much cheaper rates and hence, can significantly lower the company's IT expenses. Besides, there are many one-time-payments, pay-as-you-go and other scalable options available, which make it very reasonable for the company in question.

1.2.2 Unlimited Storage: Storing information in the cloud gives you almost unlimited storage capacity. Hence, you no more need to worry about running out of storage space or increasing your current storage space availability.

1.2.3 Backup and Recovery: Since all your data is stored in the cloud, backing it up and restoring the same is relatively much easier than storing the same on a physical device. Furthermore, most cloud service providers are usually competent enough to handle recovery of information. Hence, this makes the entire process of backup and recovery much simpler than other traditional methods of data storage.

1.2.4 Automatic Integration: Integration in the cloud, software integration is usually something that occurs automatically. This means that you do not need to take additional efforts to customize and integrate your applications as per your preferences. This aspect usually takes care of itself. Not only that, cloud computing allows you to customize your options with great ease. Hence, you can handpick just those services and software applications that you think will best suit your particular enterprise.

1.2.5 Easy Access: Once you register yourself in the cloud, you can access the information from anywhere, where there is an Internet connection. This convenient feature lets you move beyond time zone and geographic location issues.

1.2.6 Quick Deployment: Lastly and most importantly, cloud computing gives you the advantage of quick deployment [8]. Once you opt for this method of functioning, your entire system can be fully functional in a matter of a few minutes. Of course, the amount of time taken here will depend on the exact kind of technology that you need for your business.

2 Solution categories of mobile cloud computing:

2.1 General purpose mobile cloud computing (GPMCC)

Using GPMCC concepts, cloud infrastructure helps to improve the performance of mobile device. Mobile device should have label to access the cloud applications or specific resource in an on-demand fashion [3]. Many individual applications can be used to do this, but why not to use these resources in more general purpose fashion so that limited computational power of mobile devices is alleviated. Thus the tasks which were locally being computed are now computed on cloud infrastructure and response is sent back to mobile devices. By these way computer resources of the remote computers is leveraged and no need to develop specific applications for that purpose.

2.2 Application specific mobile cloud computing (ASMCC)

In ASMCC specific applications are developed for mobile devices which employ cloud computing [3]. Applications like sky drives or online file converting apps need ASMCC because internet is used as the communication resource and not only for storage or additional computational power. ASMCC has the ability to make mobile devices a more powerful computing device and provide use of many applications.

3 Augmented execution for smart phones using clone clouds

Chun, Ihm, Maniatis and Ashwin [2] introduce the idea of improving the performance of hardware limited smart phones by using their proposed clone cloud architecture. Using augmented execution through cloning in which virtual clones of smart phone are created in neared computers or cloud servers and heavy computation are deployed on clone and response is sent back to mobile device.

So they off load execution from smart phone to a computational infrastructure hosting a cloud of smart phone clone. Advantage of this concept is if the smart phone is lost or damaged the clone can be used as a backup. Another advantage is that hardware limitation of smart phone is overcome – task is transferred to high computation devices in the cloud. It also makes the developer job easy as there are no or few modifications needed to their applications.

3.1 Types of augmented execution

There is very broad range of the scope of augmented execution. In this section, I have dictated the categories of types of augmentation in Figure A. We discuss how to achieve such augmentation in the next sections.'

3.1.1 Primary functionality outsourcing: Computation-hungry applications such as speech processing, video indexing, and super-resolution are automatically split through dynamically partitioning of application fundamentals[6], so that the user-interface and other low-octane processing is retained

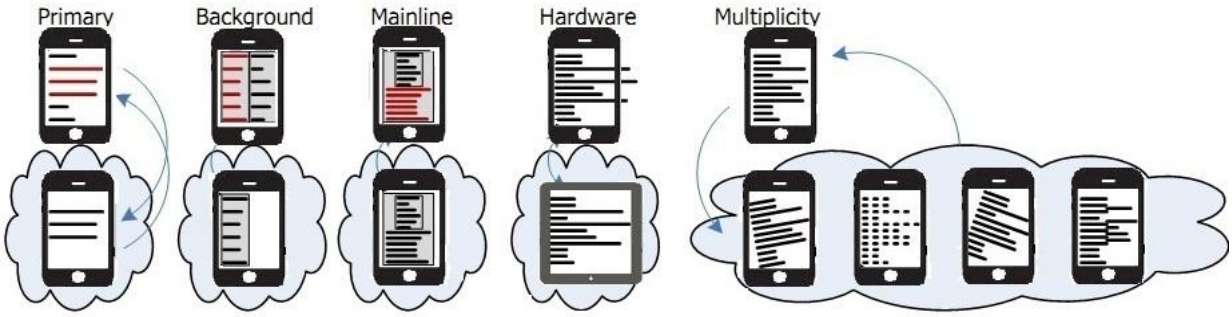

Figure 1: Various types of augmented execution

at the smart phone, while the high-power, expensive computation is off-loaded to the infrastructure, synchronously. This is similar to designing the application as a client-server service, where the infrastructure provides the service (e.g., the translation of speech to text), or as a thin-client environment.

3.1.2 Background augmentation: Differing from primary functionality outsourcing, this category deals with functionality that does not need to interact with users. Functionality that typically happens in the background, such as analyzing photos for common faces, scanning the file system for viruses, indexing files for faster search , crawling news web pages, etc. In this case, entire processes can be marked (by the user or by the programmer) or automatically inferred as "background" processes, and migrated to the infrastructure wholesale. Furthermore, off-loaded functionality can take on the role of a "virtual client." Even when the smart phone is turned off, the virtual client can continue to run background tasks. Later when the smart phone returns online, it can synchronize its state with the infrastructure.

3.1.3 Mainline augmentation: It can be categorized between primary functionality outsourcing and background augmentation [6]. User may choose to run a particular application in a wrapped fashion. Here the method of its execution is altered but its semantics remains unchanged. Examples like private-data leak detection (e.g., to taint-check an application or application set), fault-tolerance (e.g., to employ multi-variant execution analysis to protect the application from transparent bugs), or debugging (e.g., keep track dynamically of allocated memory in the heap to catch memory leaks).

3.1.4 Hardware augmentation: This category is unique because it rectifies for fundamental weaknesses of the smart phone platform, such as low memory or other constraints, and hardware abnormality.

3.1.5 Augmentation through multiplicity: This category we consider is interesting in that it uses multiple copies of the system image executed in different ways. This can help running data parallel applications (e.g., doing indexing for disjoint sets of images).

4 Cloud Cloning

A clone is a hardware or software system that performs the same task as the system of which clone is created. Clone Cloud brings the power of cloud computing to your smart phones flawlessly.

Clone Cloud [2] uses nearby computers or servers to increase the speed of your smart phone applications. This aids the power of the cloud computing to your mobile device machine. The idea is simple: clone of data and applications is created from the smart-phone on cloud and selectively execute some operations on it, reintegrating the results back into the smart-phone. We can have multiple clones for the same smart-phone, clones act as a more powerful smart-phones, etc. Clone Cloud makes smart phones more powerful, more secure, more reliable, and more power-efficient. We can execute very complex operations via cloud cloning such as object recognition, virus scanning and data leak detection without requiring application designers to explicitly plan for cloning, without eating up the smart-phone's battery power, and with significant performance improvement.

Augmented execution is achieved in four steps: A) First, a clone of the smart phone is created within the cloud (laptop, desktop, or server nodes); B) The state of the primary (phone) and the clone is periodically or on-demand synchronized; C) Application augmentations (whole applications or augmented pieces of applications) are executed in the

clone, automatically or upon request; and D) Results from clone execution are re-integrated back into the smart phone state.

5 Proposed model to improve the security between mobile cloud and clone

One of the major issues can occur in this scenario is authentication of clone. Here it can be happen that other clone pretended to be original clone and can send malicious data to the mobile device in terms of response of asked computation on clone.

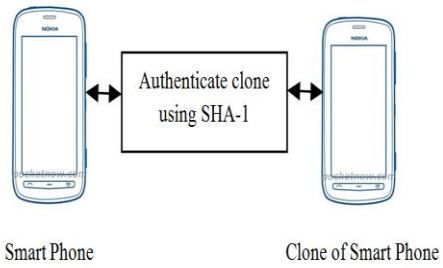

Figure2: Apply SHA-I authentication for clone

So to avoid this we can use existed authentication algorithms to authenticate mobile device clone. We can use Secure Hash Algorithm-1 for wireless communication. We can insert authentication part before sending data directly to the clone of mobile device. This will improve the security from being hacked by adversary.

7 Future Enhancements

Future of mobile cloud is very bright. Lot many developing still need to be done on security of mobile cloud computing. By using augmented execution concept we can provide mobile devices high configured device power and also we can save low battery life of mobile device. In this paper I have improve the security of synced mobile device and clone of mobile device in terms of authentication. In future we can provide access control to the clone to limit their access in mobile devices.

8 Conclusion

Augmented execution of mobile device through cloning is very good concept to improve computing power of mobile devices. The care needs to be taken that this clone must be authenticated and authorized to deploy mobile devices' data not being intruder that can gain can access of mobile device and harm mobile device system and its user.

9 References

[1]Shahryar Shafique Qureshi, Toufeeq Ahmad, Khalid Rafique and Shuja-ul-islam,"MOBILE CLOUD COMPUTING AS FUTURE FOR MOBILE APPLICATIONS – IMPLEMENTATION METHODS AND CHALLENGING ISSUES", at *IEEE CCIS2011.*

[2]Byung-Gon Chun, Sunghwan Ihm, Petros Maniatis, a nd Ashwin Patti,"CloneCloud: Elastic Execution between Mobile Device and Cloud", at EuroSys'11, April 10–13, 2011.

[3]Brent Lagesse," Challenges in Securing the Interface Between the Cloud and Pervasive Systems " , at 1st IEEE PerCom Workshop on Pervasive Communities and Service Clouds.

[4]Shuntaro Tonosaki, Hiroshi Yamada, and Kenji Kono, " Efficiently Synchronizing Virtual Machines in Cloud Computing Environments", at 2011 Third IEEE International Conference on Coud Computing Technology and Science.

[5]Thulasimani Lakshmanan and Madheswaran Muthusamy, " A Novel Secure Hash Algorithm for Public Key Digital Signature Schemes", at *The International Arab Journal of Information Technology, Vol. 9, No. 3, May 2012.*

[6]Byung-Gon Chun and Petros Maniatis, "Augmented Smartphone Applications Through Clone Cloud Execution", appeared in HotOS 2009.

[7]http://static.usenix.org/event/hotos09/tech/full_papers/chun/chun_html/

[8]http://gunnertech.com/2012/01/10-cloud-computing-advantages/