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Research Article

Leveraging Cloud Services for Mobile Social Group Formation

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Abstract

Social networks have upcoming and more popular in nowadays, and the social group's formation with people who's having common interests results in sharing and collaborative relationships between the members. Due to the increasing needs of the applications for computational power, energy and storage space, mobile technologies is recently drawing their attention to the cloud computing. To overcome the convergence of Web Services and common mobile devices and communication environments, a basic mobile Web Service support was implemented for smart phones. However, deploying such a Mobile Enterprise poses various technical challenges, similar the quality of service (QoS) and discovery perspective, for the network and as well as for mobile phone users. In this paper implement a mobile web service mediation framework (MWSMF) with MCM for summarizes the challenges and research in this domain. We have studied the security, scalability and discovery perspectives of the mobile Web services and the analysis has recognized the necessity of a mediation framework. The evaluation of this Mobile Host was also examined in detail. Further investigation of the Mobile Host to support proper QoS and to check Mobile Host's feasibility in the networks, recognized the fundamentals of a mediation framework.

Keywords: *Mobile web services, Mobile Host, Mobile Enterprise, cloud computing and QoS.*

Introduction

Social networks [Boyd DM *et al*, 2008] have become more popular these days, with millions of members, from several countries and with different environments and curiosities. Facebook [Facebook Inc] and Twitter [Twitter Inc] are the most famous social networks of them, with respectively more than 800 million and 200 million active members. The number of users present in the network is a great opportunity to create business and professional connections around the world. People with similar interests in the social network can take benefits of the social network advantages like creation of relationships, manage, referrals and public recognition the social capital. Social groups [Palla G *et al*, 2007] also results in sharing and collaborative relationships between the users. For instance, a group of members developing in the same research area can collaborate with each other sharing ideas, knowledge and resources, etc. This needs in improving their common aims faster. At the same time, the cloud computing [Armbrust M *et al*, 2009] platform has become very popular and has led to new business models and application opportunities such as intensive batch processing applications for business analytics, human activity recognition, collaborative tools, among others. Cloud computing is a approach of computing in which, typically, resources extendable on demand are supported "as a service (aaS)" over the Internet to the people who need not have knowledge of, control over or expertise in the cloud infrastructure which supports them. The supporting of cloud services occurs at the different levels are Infrastructural (IaaS) or Platform (PaaS) or at the Software (SaaS). The vast number of services provided in the cloud has become a commodity in people's day-to-day life. For instance, collaborative tools such as Google Docs and Zoho are extensively being used by millions of people around the world for document sharing. Similarly, thousands of pictures are being uploaded daily to cloud services such as Picasa or Flickr for sharing and storing media files. Likewise, services such as Google Maps and Bingo Maps enable the provisioning of location-based services.

However, a cloud service usually does not provide a rich functionality by its own. Several services are to be combined with each other to add a significant value for the user, pushing the mash-up idea. For example, by blending Google Maps and Sound Cloud, a media file sharing service; it is possible to visualize the songs and tracks uploaded by a user in the geographical location where those media files were recorded/uploaded. Furthermore, the development of more complex and richer applications like foursquare [Foursquare Inc] is only possible by blending several rich services like social network, location-based services, media files storage, IaaS. To sum up, a mash-up application is one that blends or mixes two or more services into a single application, combining data, presentation, and functionality, with the aim of enriching its functionality, improving the user experience, and

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adding more value for the user. Finally, the development of a mash-up application implies the easy and fast integration of different APIs and data sources into a single application.

Meanwhile, the mobile computing domain also has advanced rapidly and enabled the new generation of cloud based and context-aware mobile applications. Consequently, Clouds are looking proceed to the mobile domain, having their assumption concentrate in the idea of supporting the access and consumption of cloud services at the different levels from mobile devices. Nowadays, mobile devices are equipped with embedded sensors and input devices such as cameras, GPS, accelerometer, magnetic sensor, among others. Moreover, these new capabilities can be combined also with other services and mash-up applications giving place to mobile mash-up applications. A mobile mash-up application not only blends into a single application several services but also uses the data gathered by embedded sensors and devices in order to enrich the mobile application. For example, foursquare uses the GPS sensor embedded in the device to determine the user's location and provide information about the services around. Similarly, Zompopo [Srirama SN *et al*, 2011] is a human activity recognition application, which analyses the data collected by the accelerometer, for identifying the activities.

However, these new applications that rely on the cloud are only possible due to the recent enhancements in mobile devices. Improvements on hardware (memory, embedded sensors, touchscreen, power consumption, better ergonomic design, etc.), in software (more numerous and more sophisticated applications due to the release of iPhone [Apple, Inc] and Android [Android Inc] platforms), and in transmission (higher data transmission rates achieved with 3G and 4G technologies and ubiquity of Wi-Fi networks) have contributed toward having higher mobile penetration and better services provided to the customers. This has lead to the Mobile Cloud Computing (MCC) domain. Such a mobile cloud benefits applications from several domains like context-aware, social networks, productivity tools and biometrics. Decaf [Van Vliet J *et al*, 2011], a cloud resource management application, and Bakabs [Paniagua C *et al*, 2011], a cloud based cluster estimation application based on load, which uses data from Google Analytics and linear programming techniques in the process, are clear examples of mobile applications accessing cloud services.

CroudSTag [Srirama S *et al*, 2011] is a mobile application implemented for Android devices, with the goal of supporting in the social group construction by means of facial recognition technologies and MapReduce [Dean J *et al*,2008] video processing. CroudSTag identifies the people who appear in media content such as pictures or videos and combine them together into a social group. For instance, assume a researcher who participate conferences around the world and has a set of media content (pictures and video files) of the user with whom he/she had cooperate at the event. The media files are apparently taken from his/her mobile itself and are stored on the cloud. The researcher coming after wants to create and keep contacts with his people known informally on the social network. He/she also needs to group them according to specific attraction and would like to follow the groups directly from his/her mobile phone. The scheme can also be envisioned with any other type of the event or community that wants to keep its users in contact, something like alumni. More methods have been surveyed based on social networks which are discussed in the following section.

Related Works

Expanded research has been maintaining in the computer vision domain during the past two decades, establish in face detection and facial recognition. These analyses have achieved large enhancements in the generation of approaches and methodologies for facial detection and recognition. However, they happen to be resource and time demanding and thus are not suitable for resource constrained devices like mobile phones.

For example, [Turk M *et al*, 1991] deployed a framework for the recognition and detection of human faces, which needs to work in near-real-time. The framework illustrate a face as a two-dimension set of component and tries to recognize a user by comparing his/her face component to those which are already known. This method has been widely used in applications that rely in the detection and recognition of user using computer vision ability. This approach treats face recognition as a two-dimensional recognition problem taking improvements of the face that faces are normally upright and thus may illustrate by a small set of 2-D essentials views. Face images are concluding onto a feature space that best encodes the abnormality among known face images. The face space is described by the set of faces; they do not necessarily correspond to unique features such as eyes, ears and noses. The framework contributes the capable to learn to recognize new face in an unsupervised manner. However, such applications commonly need to be trained with large datasets demanding huge amount of resources and time.

In [Chang B *et al*, 2011] employs the cloud capabilities for creating an access security framework by means of facial recognition.We suggest a Hadoop cloud computing together with access security by using the fingerprint identification and face recognition. In Hadoop cloud computing is associated to serve plenty of mobile devices or thin clients by the wired or wireless network. In fact a controller (master) may be linked to several nodes (slavers) to form a Hadoop cloud computing, where the cloud computing introduces the services like SaaS, PaaS, and/or IaaS. However, these approaches focus only in the detection and recognition, usually for authentication purposes, and they lack the social group formation capabilities present in CroudSTag. Despite, the enhancements in the facial recognition techniques have improved the accuracy and the rate of detection; they are mostly applied in biometrics and security domains like in Chang *et al*. work. In contrast, CroudSTag aims the social group formation of people by processing media files via facial recognition.

Furthermore, [Hadid *et al*, 2007] proposes an authentication technique for authenticating users by means

of facial recognition with the use of mobile devices. It considers Haar-like [Lienhart R *et al*, 2002] features with Ad-aBoost [Freund Y *et al*, 1996] for face and eye detection, and local binary pattern (LBP) approach for face authentication. Additionally, it uses the facial recognition only for authentication and the process occurs locally in the mobile device. Correspondingly, [Ijiri *et al*, 2006] try to solve the security and usability issues that arise when the mobile devices store private information from the user such as payments, back accounts and credit cards, personal pictures. They offer an authentication mechanism that uses the camera embedded in the device for taking a picture of the user that is analyzed with the help of facial recognition techniques. Even though, Ijiri's and Hadid's work have proved to be effective, their purpose is distant from CroudSTag's aim. Besides, the social group formation by means of composition of cloud services at IaaS and SaaS level is characteristic that truly distinguishes CroudSTag from other applications.

In [March *et al*, 2011] introduces µ-Cloud, a structure for building rich mobile applications based on composition of cloud services. We show that rich mobile applications can be achieved through the convergence of mobile and cloud computing. We address two main drawbacks in cloud-enabled mobile applications, namely offline usability and complexity of application development. After that propose µ-Cloud framework which models a rich mobile application as a graph of components distributed onto mobile devices and the cloud. Lastly, we discuss µ-Cloud's major research negative aspects, i.e., offline usability, workflow language for interactive applications, energy optimization and portability, secure and scalable multi-tenancy. Nevertheless, the work does not clarify how the framework scales under heavy workloads neither how it handles the authentication across the different cloud services. In addition, µ-Cloud proposes a facial recognition application; though, it is restricted to detect faces and compare them against a reduced repository of known faces.

In Facial recognition technologies [Dominik I *et al*, 2009] are one of the most promising features for the mobile users. There have been more attempts to combine the facial recognition capabilities to mobile devices. Some manufactures such as Sony Ericsson incorporated the feature in its model X10 [Sony Ericsson Mobile Communications AB, Inc 2010] the "Recognizer" application. This application enables the user to take a picture using the camera and recognize people present in the picture. It accumulates the pictures locally in the device and only recognizes people who are present in the contacts list and have a picture identified. However, it inadequacy the opportunity to search people in the social networks or take benefits of cloud technologies, and finally overloads the storage resources of the phone with the pictures taken.

Proposed System

In the existing system, MCM is mainly used to send an acknowledgment back to the mobile, notifying that the process has been started. Then, the device is free to start other applications or a new process at MCM. When MCM finishes with the facial recognition process, it sends the list of people recognized, asynchronously to the device.

Problem in existing system

- However, Finding such a Mobile Enterprise causes numerous technical challenges, like the quality of service (QoS) and discovery aspects, for the network and in addition for mobile phone users.
- Likewise, enormous number of web services possible, with each Mobile Host providing some services in the wireless network, makes the discovery of these services quite difficult.

Our proposed work presents, Mobile data services together with Web services are appearing the path breaking domain in present research of information systems. In mobile Web services sphere, resource inhibited mobile terminals are used as both Web services clients and providers. Whereas service delivery and management from Mobile Host are technically feasible, the facility to provide proper quality of service (QoS) and discovery mechanisms for the large number of services feasible with Mobile Hosts is observed to be very essential. We have studied the, scalability, discovery and security aspects of the mobile Web services and the analysis has recognized the requirement of a mediation structure. This work summarizes our QoS and discovery research and argues the realization details and kind of our enterprise service bus technology based integration structure for mobile Web service conditioning.

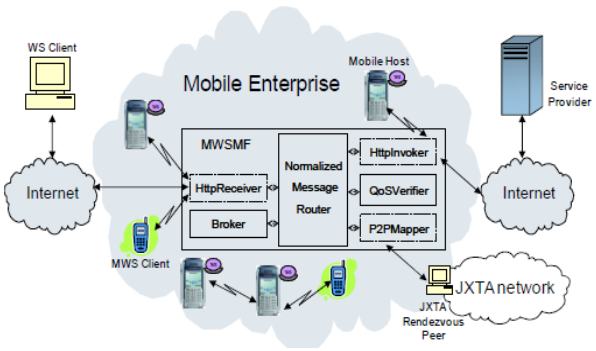

Figure 1 Mobile Enterprise setup with Mobile Hosts and MWS clients

Though service delivery and management from Mobile Host are technically feasible, the facility to provide proper Quality of Service (QoS), particularly in cases of security and scalability, from the Mobile Host is examined to be very significant. Furthermore the enormous number of Web services possible, with each Mobile Host given that some services in the wireless network, makes the finding of these services quite complex. Therefore appropriate QoS and discovery mechanisms are necessary for successful acceptance of mobile Web services into industrial environments. Depend upon our Mobile Host's application, QoS and discovery research; the need for a mediation framework is identified or proxy for arranging Mobile Hosts in the cellular networks. The work deals with our QoS and discovery research and examines the characteristics and realization facts of the mobile Web services mediation structure.

Mobile Hosts with correct QoS and discovery mechanisms, allow seamless integration of user-specific services to the Mobile Enterprise. Furthermore services provided by the Mobile Host can be included with larger enterprise services fetching added value to these services. On the other hand, enterprise networks organize disparate applications, business processes that need to communicate or exchange data with each other or in this exact situation dealt by the work, with the Mobile Hosts. The applications, platforms and procedures of enterprise networks usually have non-compatible data formats and noncompatible communications protocols. In addition, inside the domain of our research, the QoS and discovery revise of the Mobile Host presented solutions in disparate technologies.

Figure 1 shows the Mobile Enterprise and the fundamental components of the mediation structure. For realizing the mediation structure we relied on ServiceMix, an open source functioning of ESB, depends on the JBI specification. JBI design holds two types of mechanism Service Engines and Binding Components. Service engines are components responsible for executing business logic and they can be service providers/consumers. Service engine components carry content-based routing, orchestration, rules, data transformations etc. Service engines communicate with the scheme by exchanging normalized messages across the normalized message router (NMR). The normalized messaging model is depends on WSDL specification. The service engine components are revealed as straight lined rectangles in the figure. Binding components are utilized to send and receive messages across specific transports and protocols. The binding components marshall and unmarshall messages to and from protocol-specific data formats to normalized messages. The binding components are exposed as dashed rectangles in the Figure 1.

Based on the revision and analysis, dealt in the previous section, the responsibilities of the mediation structure are recognized. The mediation structure should hold the transformation and routing of the Web Service messages. The routing should be based on substance. It should help in given that QoS for the Mobile Hosts and mobile Web Service clients. From security front, MWSMF should offer end point security by providing identity, which assists in achieving appropriate authentication and authorization. From the scalability front it should hold up the transformation of messages between the complete WS* condition and the specifications realistic for mobile Web Service provisioning.

While the MWSMF was rewarding in achieve the integration necessity of the Mobile Host and the Mobile Enterprise. Then a standalone framework again faces the problems with heavy loads. The issues with scalability are quite suitable in such scenarios and the system should scale on demand. For instances number of Mobile Hosts offering the services and the number of services offered by the Mobile Hosts can explode while some events are underway. The framework has to support for increases the number of MWS clients. The framework elasticity is can be described as its capability to adjust according to the varying number of requests, it has to support.

The Mobile Web Services Mediation Framework (MWSMF) is discovered as mediator between the web service clients and the Mobile Hosts. The mobile web service clients in the Internet can thus invoke the services deployed with the Mobile Host, via the MWSMF. The mediation framework establish the QoS of the mobile web service messages and transforms them as and when mandatory and routes the messages based on their content to the specific Mobile Hosts. Apart from managing the security and enhancements to scalability the QoS provisioning characteristics of MWSMF also involving failure handling, message persistence, transaction and guaranteed delivery are provided. Enterprise Service Bus (ESB) is the most current implement in enterprise integration domain and a standard based ESB resolves the integration issues elevated by the MWSMF.

The routing should be based on content. It should aid in providing QoS for the Mobile Hosts and mobile Web Service clients. From security point, MWSMF should offers end point security by giving identity, which aids in attaining proper authentication and authorization. From the scalability point it should provide the transformation of messages between the complete WS* requirements and the requirements feasible for mobile Web Service provisioning.

MWSMF should also provide the automatic startup of the Mobile Hosts. Normally hand-held devices have many resources issue like less computation capacities, restricted storage capacities, battery power is limited etc. So to protect these resources, the Mobile Host characteristics of the smart phones can turn-on only at the client request. The MWSMF can determine when the request is for particular mobile phone, using profiles, and can send a SMS message based on specific protocol, which activates the Mobile Host.

The MWSMF supports some crucial services necessary in the QoS and discovery maintenance of mobile Web services apart from acting as the integration framework for mobile Web service provisioning. Some of the Web services developed with the MWSMF involves to identity relevant services that store and support the asymmetric keys used in security analysis of the messages exchanged by participating Mobile Hosts and mobile Web service clients. The services also manage and support authentication and authorization details of the participants, thus aid in realizing the end point security. Likewise context aware services support the context information of Mobile Hosts and developed services and profiles of the mobile Web service clients. The services thus help in realizing context aware service discovery.

The MWSMF recognizes the contact details of the phone, when the request is for particular Mobile Host, and sends a Short Message Service (SMS) to the device. A generic program is run on the smart phone that starts the Mobile Host automatically and activates its services and features, when the message is received. The SMS messages follow specific application protocol. Currently, our protocol has support for only the basic features of the Mobile Host like starting the server and authenticating the client. The person with the Mobile Host can also opt to turn down this request from client.

Suitable QoS and discovery techniques are necessary for rewarding adoption of mobile web services into commercial environments. Moreover, the QoS and discovery analysis of mobile web services has constructed the necessity for mediator nodes aiding in the integration of Mobile Hosts with the enterprise.

While we were prosperous in supporting MWSMF on standard servers, the scale of the Mobile Enterprise is leading us to the incipient utility computing paradigm, cloud computing. In this study we are trying to establish the mediation framework on a public cloud infrastructure so that the framework can habituate itself to the loads of the mobile operator proprietary network, thus mainly availing in horizontal scaling and load balancing the MWSMF.

Experimental Results

Figure 2 displays the times taken for handling a client under various concurrent requests. Each concurrent client in turn generated 5 successive requests. The steady increase in average durations to handle a client is quite normal and the mean duration of handling a single request, across all concurrent successful requests; at the MWSMF+MCM are about 150 milliseconds. The mediation framework was successful in handling up to 110 concurrent requests without any connection refusals. The sharp decline in times after 240 concurrent requests is because of a large number of failed requests at this high concurrency level. The analysis shows that the mediation framework itself is scalable and improves the scalability of the Mobile Host.

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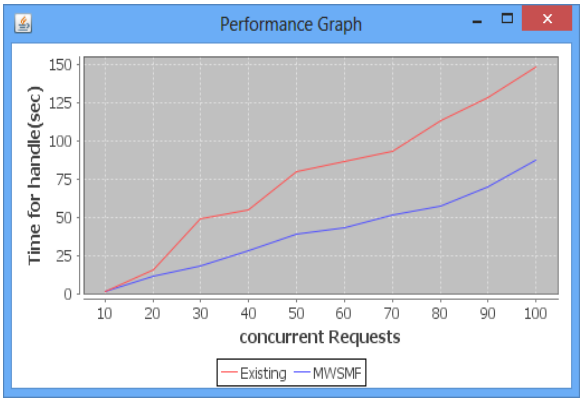

Figure 2 Times to handle a client at the MWSMF, under different concurrency levels

Conclusion

These works first deals QoS perspective of mobile Web services with consideration to mobile Web service provisioning from smart phones. The important topics of interest in this discussion are the mobile Web service's security and scalability issues. The work addressed the discovery issues and proposed our mobile Web service publishing and discovery methodology in networks. The implements in the web services domain, the enhanced device capabilities of the smart phones and the enhanced transmission capabilities of the cellular networks have led to the mobile web services provisioning domain. With this work, we tried to summarize the challenges and research combined in this domain and organizing the Mobile Enterprise. The QoS perspective of the deployment of Mobile Host, similar supporting proper security and scalability, and the discovery of the provided services are addressed briefly. Further, the QoS and discovery determination of the Mobile Host have raised the fundamentals for a middleware framework and the features and realization details of the MWSMF are discussed. This work presents that MWSMF+MCM is horizontally scalable, thus allow for utilizing cloud's flexibility to meet load requirements in an easy and quick manner. Then we also addressed the features, components and realization details of the MWSMF+MCM. The regression examine of the mediation framework managed with the mobile web service message optimization scheme, clearly present that the mediation framework has reasonable levels of performance and the MWSMF+MCM can scale to handling huge number of simultaneous clients, feasible in mobile operator networks.

References

Boyd DM, Ellison NB (2008) Social network sites: definition, history, and scholarship. J Comput Mediat Commun,vol-13:pp 210–230.

Facebook,Inc. facebook.com. http://www.facebook.com

Twitter, Inc. Twitter. com. http://www.twitter.com/

Palla G, Barabási A, Vicsek T (2007) Quantifying social group evolution. Nature,446(7136),pp 664–667.

ArmbrustM*et al* (2009) Above the clouds, a berkeley viewof cloud computing. Technical report, University of California, Berkeley.

Foursquare. Foursquare. https://foursquare.com/

Srirama SN, Flores H, Paniagua C (2011) Zompopo: mobile calendar prediction based on human activities recognition using the accelerometer and cloud services. In: 5th international conference on next generation mobile applications, services and technologies, pp 63–69.

Apple, Inc. IPhone. http://www.apple.com/iphone/

Android. Android. http://www.android.com/

Van Vliet J, Paganelli F (2011) Programming, Amazon EC2.O'Reilly Media, Sebastopol.

Paniagua C, Srirama SN, FloresH(2011) Bakabs: managing load of cloud-based web applications from mobiles. In: The 13th international conference on information integration and web-based applications and services (iiWAS-2011), ACM, pp 489–495.

Dean J, Ghemawat S (2008) Mapreduce: simplified data processing on large clusters. Commun ACM 51(1), pp 107–113.

Turk M, Pentland A (1991) Face recognition using eigenfaces. In: Computer vision and pattern recognition, 1991, proceedings CVPR'91, IEEE computer society conference on, IEEE, pp 586–591.

Chang B, Tsai H, Lin Z, Chen C (2011) Access security on cloud computing implemented in hadoop system. In: Genetic and evolutionary computing (ICGEC), 2011 fifth international conference on, IEEE, pp 77–80.

Hadid A, Heikkila J, Silven O, Pietikainen M (2007) Face and eye detection for person authentication in mobile phones. In: Distributed smart cameras, 2007, ICDSC'07m, First ACM/IEEE international conference on, IEEE, pp 101–108.

Lienhart R, Maydt J (2002) An extended set of haar-like features for rapid object detection. In: Image processing 2002. Proceedings of 2002 international conference on, vol 1, IEEE, pp I–900.

Freund Y, Schapire R (1996) Experiments with a new boosting algorithm. In: Machine learning-international workshop then conference, Morgan Kaufmann publishers, Massachusetts, pp 148–156.

Ijiri Y, SakuragiM, Lao S (2006) Security management for mobile devices by face recognition. In: Mobile data management, 2006, MDM 2006. 7th international conference on, IEEE, pp 49–49.

March V, Gu Y, Leonardi E, Goh G, Kirchberg M, Lee B (2011) [μc] cloud: towards a new paradigm of rich mobile applications. Procedia Comput Sci (5), pp 618–624.

Dominik I, Sankar KP, Kong BH, Gu J, Kuroda H, Kim TH (2009) Signal processing, image processing and pattern recognition.

Sony Ericsson Mobile Communications AB, Inc (2010)XperiaX10. http://www.sonyericsson.com/cws/products/mobilephones/overview/

Srirama S, Paniagua C, Flores H (2011) Croudstag: social group formation with facial recognition and mobile cloud services. Procedia CS 5:633–640.