Analysis of Mobile Service Oriented Architecture for Different Applications

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Abstract— Today Mobile phones are widely used for delivery of business and government services. SOA light weight framework used to develop a wide range of business and government mobile applications. This paper aims to analysis of Mobile service oriented Architecture for different applications. This paper identifies the scope, recent trends and future scope of SOA based Mobile Services.

Index Terms— SOA, Service-Oriented Architecture, Mobile services, Web services, XML, WSDL, SOAP

1 Introduction

MOBILE phone is undoubtedly a phenomenon in the rise of 21st century. During the past ten years, we have witnessed how mobile phones and the simple functions of voice and text messaging (SMS) can empower citizens and affect the way citizens interact with each other and with the society as whole [1]. Information and wired/wireless Communications technologies have potential to support governance services in different dimensions such as citizens, business and government [2]. Service-Oriented architectures and Service-Oriented Computing are the most recent approaches aiming at facilitating the design and development of applications on distributed systems [3]. Implementation of SOA is done by means of Web Services. Web Service technology is recognized as the most appropriate SOA implementation technologies and XML, WSDL and SOAP are used in Web Service technology as the main apparatus for message exchange and data construction.

The remaining part of paper is organized as Section 2-Background, Section-3 Literature survey, Section-4 Existing methodologies, Section-5 Analysis, Section-6 Comparison, Section-7, Results and Section-8 Conclusion.

2 Background

Mobiles have great potential to expand public services in areas where wired telecommunications and ICT services do not exist but there are still limits to its capabilities. Today the use and development of wireless web technology are reaching to critical mass and we are witnessing an explosion in the use of wireless Internet applications including Internet ready mobile phones and PDA [2].

A Mobile service is equivalent to an application realized by combining several services in a SOA, composed of several standardized components Service Logic, Service State, Service Content, Service Content Meta Data and Service Profile [3]. Service-oriented Architecture (SOA) as the foundation for distributed applications in heterogeneous m-Healthcare environments [4]. The basic structure of SOA consists of three roles: service provider, service requester and service broker. The service provider publishes its services to the service broker and makes the services available to the users who need them. The service requester is a consumer of services. The service broker or UDDI (Universal Description Discovery and Integration) is a service registry or a catalog of the services. In order to allow a consumer to access the service the provider has to publish a description of the service called WSDL (Web Service Description Language) which is an XML-based language for describing services and how to access them. The service can be exchanged between provider and consumer through a standard protocol named Simple Object Access Protocol (SOAP) [5].

Service Oriented Architecture (SOA) as a paradigm for organizing and utilizing distributed capabilities that may be under the control of different ownership domain and implemented using various technology stacks [6]. SOA provides an approach to solve the platform interoperability problem it is not designed to automatically address the mobility problem [7]. A Service-Oriented Architecture (SOA) is a contractual architecture to offer and consume software as services. [8].

3 Literature Survey

Conducted a Literature survey for Mobile services system, Service-Oriented architecture, SOA framework and Mobile Applications for the analysis purpose.

With the growing popularity of Internet and mobile devices, mobile applications and services become more pervasive in our daily life. Service-Oriented architecture is a collection of services which communicate with each other; a service is different from an application and a service should be self-contained. It can always provide the same functionality, independently of other services. [3]. Service-oriented Architecture (SOA) as the foundation for distributed applications in heterogeneous m-Healthcare environments; SOAMOH platform is based on Service-oriented Architecture is scalable and SOAMOH services are designed to enable easier composition of new applications and services [4]. SOA is an architectural paradigm and discipline that may be used to build infrastructures enabling those with needs of consumer and those with

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capabilities of providers to interact via services across disparate domains of technology and ownership [5]. Service Oriented Architecture (SOA) as a paradigm for organizing and utilizing distributed capabilities that may be under the control of different ownership domain and implemented using various technology stacks [6].

Context-Awareness means the ability of sensing and reacting according to the context; the concept of dynamic capability which is defined as the ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environment from the resource view of a system [7]. Mobile services includes Information resources, telemetry, mobile shopping, Mobile banking, m-government and technological assistance for dynamic way finding; at present service oriented architectures (SOA) implemented by Web Services technology are widely used as approaches for supporting services on wired networks (e-services) [8].

4 Existing Methodologies

SOA and SOC are merely extensions of the existing concepts and new technologies, like XML Web Services, are being used to realize platform independent distributed systems [3]. Clarke has developed a GPRS based monitoring system that transmits vital signs on a continuous Basis for Tele monitoring also Chu et al have designed a system for simultaneous transmission of a patient's video, medical images and ECG signals through 3G networks for the purpose of pre-hospital trauma care [4].

Amirian and Alesheikh proposed a service oriented framework for disseminating geospatial data to mobile, desktop and web clients, framework consists of three layers: a client layer, a geospatial web service layer and a data source layer [5]. MOBY application, that proposed by Tzvetan et, al. they present a Mobile Peer-to-Peer Service and Data Network that consist of fourfold end-user transparency, ubiquity, ease of application integration, performance also Yanxin, proposed the emergency decision model management based on SOA and applied on multi agent system (MAS) based approach to model management [6].

When the SOA standard is applied to lightweight mobile devices the limited computing capability of mobile devices has to be taken into consideration; besides the limited computing capability of mobile devices, the mobile environment is not as static as the hardwired environment [7]. Currently Web Services technology implements SOA by means of standard XML-based initiatives, for implementation three initiatives are used in order to support interactions among Web Services: SOAP (a way to communicate), WSDL (a way to describe services) and UDDI (a name and directory server) and there are three types of communication between a client application and a Web Service: Static Stub, Dynamic proxy and Dynamic invocation interface (DII) [8].

5 Analysis

Analysis performed for the Mobile Service Oriented Architecture for Different Applications are as follows:

Do van Thanh, Ivar Jorstad [3] designed a Framework for Service-Oriented Architecture for Mobile Services to verify the feasibility of using Service Oriented in the design and implementation of mobile services, SOA Framework for mobile services builds on and extends the basic SOA with several conceptualizations, components and mechanisms. Wee Siong Ng, Joseph Chee Ming Teo, Wee Tiong Ang, Siva Kumar Viswanathan and Chen Khong Tham [4] developed a Service-oriented Architecture (SOA) for m-Healthcare services platform that that enables real-time monitoring of a patient's health as well as access personal medical record stored in a centralized Electronic Health Records (EHR) repository. Jintana Khemprasit and Vatcharaporn Esichaikul [5] designed SOA-Based Mobile Application for Crime Control in Thailand to facilitate mobile spatial information services, the GIS service provides the geographic functions such as a point of interest (POI) function to find the nearest or a specific place, a route function to determine the path of vehicle from one point to another point with the shortest distance or fastest travel time and a map viewing function to display the geographic information on a Mobile device.

Walisa Romsaiyud [6] designed m-SOA (mobile Service Oriented Architecture) data model for emergency environments that based on many factors such as emergency location, emergency type, approximate time when the emergency happened and patient information; Designed and recorded data at center stores and manage all patients' information in one place and enhances communication channel which available everywhere via GPS. Chin-Chih Chang and Judy C. R. Tseng, Kwei-Jay Lin [7] proposed model of dynamic capabilities to study how systems can dynamically integrate, compose, and reconfigure internal and external competencies in responding to rapidly changing environments; architecture is designed to facilitate a variety of mobile service applications also introduced the concept of the dynamic capability level applies it to context-aware mobile SOA and use it to classify the problem complexity of context-aware services. Elena Sanchez, Sandra Martin-Ruiz, Jorge Rodriguez- Pedrianes [8] proposed a SOA based Open and Dynamical Architecture for Supporting Mobile Services, framework proposed service providers and new services can easily be added at anytime without updating the application of users' mobile devices when new services are incorporated; Implemented as a first prototype with open source tools.

From the above discussions it is summarized that Framework for Service-Oriented Architecture for Mobile Services [3] verify the feasibility of using Service Oriented in the design and implementation of mobile services. m-Healthcare services, SOAMOH [4] facilitate the provisioning of healthcare to people anywhere, anytime using mobile devices that are connected through wireless communication technologies. SOA-Based Mobile Application for Crime Control in Thailand [5] facilitates mobile spatial information services. m-SOA data

model for emergency environments [6] based on many factors such as emergency location, emergency type, approximate time when the emergency happened. Dynamic capabilities [7] study how systems can dynamically integrate, compose and reconfigure internal and external competencies in responding to rapidly changing environments. Open and Dynamical Architecture for SOA [8] addresses the issues dynamical integration of new services by providers at anytime, dynamical discovery of available services and the use of open source software to develop the solution.

6 Comparison

Comparisons of Mobile Service Oriented Architecture for Different Applications w.r.t. findings and shortcoming are as follows:

A Service-Oriented Architecture Framework for Mobile Services [3] Support for mobile services in SOA and in particular the support for service continuity and personalization in mobile services but the support for service continuity and personalization in mobile services is dependent on the availability of instances of the Service Logic component. Service-oriented Architecture for m-Healthcare services platform, SOAMOH [4] does Real-time monitoring of a patient's health as well as access personal medical record stored in a centralized (EHR) repository but shortcoming of system are Security, Mobile systems incompatibility, Lack of awareness and adequate understanding of SOA and Seamless handover between wireless networks. SOA plays an important role in support data exchange and model sharing from heterogeneous sources in a SOA-Based Mobile Application for Crime Control in Thailand [5] also facilitates mobile spatial information services but there is no standard framework for crime data collection, integration and Dissemination through mobile devices.

Mobile data model for emergency situation [6] based on SOA paradigm, enhanced performance on mobile device as GPS and mobile networking but Performance on mobile device is applied for mitigating on emergency situations. For Dynamic Capability Framework for Context-Aware Mobile Services [7] findings are Adaptation, Context-awareness, Reactivity and Seamlessness; Shortcomings are identifying the contexts and weighting, identifying the interaction among different context, retrieving usable and affordable services. For Open and Dynamical Service Oriented Architecture for Supporting Mobile Services [8] open source development tools for building, deploying and testing production quality work well together but UDDI registry cannot be directly accessed by mobile devices and specific implementation is required in order to support complex types when dynamic invocation interface is used.

Above comparison summarized that a Service-Oriented Architecture Framework for Mobile Services [3] provides support for service continuity and personalization in mobile services, Service-oriented Architecture for m-Healthcare services platform, SOAMOH [4] does real time monitoring and information in centralized directory and SOA plays an important role in support data exchange and model sharing from heterogeneous sources in a SOA-Based Mobile Application for Crime Control in Thailand [5]. Mobile data model for emergency situation [6], enhanced performance on mobile device, Capability Framework for Context-Aware Mobile Services [7] support Adaptation and Context-awareness, Reactivity and Seamlessness and Open and Dynamical Service Oriented Architecture for Supporting Mobile Services [8] implement Web Services technology using open source.

7 Results

Following are the results of analysis and Comparison of Mobile Service Oriented Architecture for Different Applications:
1. Service continuity and Personalization: A Service-Oriented Architecture Framework for Mobile Services [3] Support for service continuity and personalization in mobile services.
2. Real-time Monitoring: Real-time monitoring of a patient's health as well as access personal medical record stored in a centralized Electronic Health Records (EHR) repository [4].
3. Data exchange and model sharing- SOA plays an important role in crime control [5] as an appropriate way to support data exchange and model sharing from heterogeneous sources.
4. Performance- For Mobile data model for emergency situation [6] mobile application enhances the Performance of individualized channel of Communication via GPS technology.
5. Adaptation, Context-awareness - Dynamic capability [7] level classify the problem complexity of context-aware services, Reactivity and Seamlessness.
6. Web Services access- For Open and Dynamical Service Oriented Architecture for Supporting Mobile Services [8] architecture allows accessing Web Services of wired network from mobile phones at runtime without prior knowledge of available services.

8 Conclusion

SOA Plays a vital role in design and development of Mobile based applications. From the analysis of Mobile service oriented Architecture applications it is summarized that SOA based Mobile services architecture provides support for service continuity and personalization, efficiency, support data exchange and model sharing, enhances the Performance of individualized channel of Communication, Open source development tools for building, deploying and testing and web services access of wired network from mobile phones. Mobile Framework with SOA makes architectures a feasible solution for development and implementation of business and government applications.

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