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Implementation of Service Oriented Architecture in Mobile Applications to Improve System Flexibility, Interoperability, and Scalability

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Abstract

This research aims to apply Service Oriented Architecture (SOA) to mobile applications to improve the flexibility, interoperability, and scalability of the system. SOA is an approach that enables better integration between different components in an application architecture. Mobile applications, as an integral part of everyday life, require high flexibility and adaptability to changing user needs. The research method used involves application requirements analysis, SOA architecture design, and implementation on an existing mobile application. Through the implementation of SOA, resource management and service distribution become more efficient, making it easy to add or change features without affecting the entire system. Test results show improved application performance and responsiveness, along with the ability to easily integrate services from multiple sources. In addition, the SOA architecture provides flexibility in the development and maintenance of mobile applications, accelerating the development process and minimizing the impact of changes. This research contributes to the development of mobile applications by introducing the SOA approach as an architectural foundation. The implementation of SOA in mobile applications is expected to guide developers in creating systems that are more resilient, adaptive, and easy to integrate with rapidly evolving software environments.

Keywords: systems, artificial intelligence, e-commerce.

INTRODUCTION

The development of information technology has become very rapid. In addition to desktop computers and laptops, this development is moving towards mobile in the form of mobile applications. The mobile application market is huge, with 160 million users [1].

However, in contrast to desktop and laptops, in the mobile environment there are many mobile platforms that are used, including Android, Blackberry, Windows Mobile, Symbian, and iPhone [2].

In the rapidly evolving digital age, mobile applications have become an integral part of everyday life, providing services and information quickly and easily accessible. Along with increasing complexity and user demands, mobile application development faces challenges in terms of flexibility, interoperability, and system scalability. To overcome these challenges, the application of Service Oriented Architecture (SOA) in mobile applications is an attractive alternative.

SOA is a software architecture paradigm that enables the development and integration of applications by providing services as the main unit of system construction. This approach provides great flexibility in managing application functionality, allowing easy addition, deletion or change of services without affecting the entire system. Therefore, the application of SOA in mobile applications is expected to provide a solution to increase flexibility.

Interoperability, the ability of systems to communicate and operate together with other systems, is crucial in an increasingly complex application ecosystem. SOA facilitates integration between services, enabling efficient and consistent data exchange between applications. This supports the development of mobile applications that can interact with various platforms and external services, enhancing the user experience.

System scalability is an important aspect to respond to the growing number of users and complexity of services. SOA enables dynamic adjustment of capacity by adding or subtracting services as needed, so that mobile applications can evolve along with user demand.

In this context, this research will explore the implementation of SOA in mobile applications as a solution to improve system flexibility, interoperability and scalability. By exploring this, it is hoped that a more effective and efficient way of dealing with changing user needs can be found and support the development of adaptive and resilient mobile applications.

Related Work

Existing related research on interoperability applications between mobile platforms there are Among them are by using techniques such as middleware [3] [4], separation of-concern [5], aspect oriented [6] and model driven development [7]. development [7]. In terms of SOA itself, there has been who researched about mobile SOA architecture [8] [9] including the development of mobile SOA modelling for mobile in UML [10]. Studies on the use of web services in mobile devices has also been done in [11].

METHOD

The chosen research approach for this study is qualitative research, which involves a comprehensive exploration of social phenomena. Unlike simply providing descriptions, qualitative research aims to delve into the significance and contextual understanding of these phenomena.

SERVICE ORIENTED ARCHITECTURE

Service Oriented Architecture (SOA) is a concept that focuses on services, i.e. concept that focuses on services, namely a defined function that serves to perform a specific activity [12]. With service concept, the application is only viewed from in terms of the functionality / service provided and not looking at the technical implementation of the application implementation of the application. SOA consists of three main layers application services for technical application functions, business services for business functions, and process service to run the application service and business service in one unit. [13] To do the development of SOA a method called Service Oriented Analysis and Design [13]. Stages in the methodology is the identification of business processes followed by analysis and design of the service. Implementation of services is usually done with web service because of its independent nature, free, and standardized [14].

MOBILE PLATFORM

There are five major mobile platforms now namely Android, Harmony, Windows Mobile, Symbian, and iPhone. Android is an open-source mobile platform owned by Google Inc. Based on the Linux kernel and the dalvik virtual machine, to develop applications on Android using the Java language and the Android SDK + plugins released by Google. Currently Android has reached version 14 Harmony is a mobile platform owned by RRC company. Windows Mobile is a mobile platform owned by Microsoft's mobile platform aimed at PDA devices. Starting from Pocket PC which continues to undergo changes and rebranding until it finally became Windows Phone 10 mobile now. Application development can use .NET CF or C++ with the Windows Mobile SDK. Windows Mobile. Symbian is a mobile platform owned by Nokia and is now an open-source platform. source platform. It was developed using the C++. It is currently the most widely most widely used by mobile devices in the world. iPhone is a mobile platform introduced by Apple Inc for its mobile devices. devices. It emphasizes on the user experience that the user has and displays a very attractive graphics that are very attractive. Application development using the C++ objective and must use the MAC OS operating system.

RESULT AND DISCUSSION

SOA Concept in Mobile

An application in SOA can be divided into two roles, namely the service provider role as a service provider and the service requester role as the service taker. service. For mobile devices the role that is most suitable with the limitations of the mobile device is the service provider role. An application itself will have three parts, user interface, business logic, and application logic. The user interface functions as input and output to the user. Business logic will function as the flow of business processes that organize the process flow that regulates the running of the application, while application logic is the logic of the application's technical functions.

SOA Architecture on Mobile

The SOA concept on mobile platforms uses client-server architecture. For this SOA concept there are 3 architecture that already exists, namely native client, middleware, and browser [8]. For the native client, on the client side there will be an application that is built on the native language of the application language. All parts, namely the user interface, business logic, and application logic will be contained in the client. On the server side, there is only a service for sending data only. The middleware is similar to the native client. All application will be on the client side, it's just that the application will be on top of a middleware layer. will be on top of a middleware layer. The application can run on all mobile devices that devices that have the same middleware.

For the browser, no part will reside on the client side. The application will run in a container that is the default browser of the application. All parts will reside on the server side and accessed by the client with data communication. All of the above architectures have advantages and disadvantages of each. The advantages and disadvantages of each of them are then combined in the form of a new architecture called thin native client. Thin native client is a type of architecture with the user interface and application logic are on the client side in the implementation of the native client language implementation. The business logic will reside on the server side and accessed by the client side. User interface and application logic will function as containers that are able to access all the functionality of the device, while still

providing clear separation of application business logic.

Mobile Platform Support For SOA

In general, the five mobile platforms studied Android, Windows Mobile, Harmony, Symbian, and iPhone support the implementation of SOA IMPLEMENTATION. However, this support varies levels, some of which support integrated with application APIs and some require third-party libraries. libraries. Platforms that already support integrated APIs are Symbian. are Symbian. Windows Mobile and iPhone already have APIs, but their usage is not integrated and requires manual use in terms of message parsing.

Harmony and Android require third-party libraries because they are not yet supported by the libraries because they are not supported by the standard APIs brought by the mobile platform.

CONCLUSION

The conclusion obtained in this thesis is that SOA concept is able to be applied in application using thin native client architecture. client architecture. This SOA concept is generally able to supported by the five main mobile platforms namely Android, Windows Mobile, Harmony, Symbian, and iPhone. The concept is then made proof-of-concept in a case study and implemented both on the client and server side. implemented both on the client and server side with different implementations.

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