Windows Communication Foundation for Banyumas Tourism and Culinary Information System

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Abstract
Banyumas is located in the southwest of Central Java province. Banyumas is a tourist destination that offers a variety of interesting attractions to visit, which include natural attractions, arts and culture, as well as culinary tourism. Business growth in the culinary and hospitality sectors in Banyumas region since 2011 experienced a significant increase in terms of quantity. Two of the business sectorsare a potential contributing factor for the tourism sector in Banyumas. This study attempts to introduce and market the potential for tourism, arts and culture, as well as the culinary experience inBanyumas, through WCFwhichis a middleware application development that can be used by client applications to provide information about the potential of tourism, arts and cultureofBanyumas. A multi-step study was conducted starting with data collection, analysis of functional requirements, system design, implementation, and testing of WCF applications. The WCF application consists of several services, namely download service information lists, attractions, arts, cultural and culinary information, lodging information, and downloading the tourism image data from the server. Based on the test results of the service, it can be concluded that the service functions properly and is able to distribute information to the client.

Keywords: windows communication foundation, Banyumas, tourism, culinary

1. Introduction

The Banyumas region is located in the southwest and is part of the Central Java province. Banyumas is a tourist destination that serves a variety of interesting attractions to visit which include natural attractions, arts and culture, as well as culinary tourism. Tourism is one sector of the revenue of both the State and the local area. There are several natural attractions in the Banyumas area including tourist areas and Baturaden Baturagung, while there are several cultural attractions including "Pendopo Si Panji", "Kota Lama" and "Taman Kota". Business growth in the culinary and hospitality sectors in Banyumas region since 2011 experienced a significant increase in terms of quantity. Two of the business sectorsare a potential contributing factor for the tourism sector in Banyumas.

This study attempts to introduce and market the potential of tourism, arts and culture, as well as the culinary experience inBanyumas through data distribution from the database server DINPORABUDPAR Banyumas to a client application using WCF (*Windows Communication Foundation*) Services. WCF is an application programming interface of the data communication developed by Microsoft for *Service Oriented Architecture* [1], which is part of the NET Framework and Microsoft design a unified model for the program development with data communications providing the most flexible and the most basic support [2]. The three main design goals of WCF are interoperabillity across platforms, service-oriented development and unification of existing distributed technology [3]. Specifically, it is the middleware that applications can use to talk to each other, whether they are on the same machine, distributed over a LAN or even on the Internet [4].WCF is implemented primarily as a set of classes on top of the .NET Framework's CommonLanguage Runtime (CLR). This lets .NET developers build service-oriented applications in afamiliar way. WCF allows clients to access services. Both theclient and the service can run in pretty much any Windows process. WCF doesn't define arequired host. Wherever they run, clients and services can interact via SOAP, via a WCFspecificbinary protocol, and in other ways [5].

We use the REST(*Representational State Transfer*)protocol as the communication protocol between the client application with a WCF service.REST is a protocol contained in the web service technology[6]-[9],designed to minimize the complexity of web service development

and improve the scalability of the system [10]. Several types of operation that can be performed by the client application on REST web service protocol include GET, POST, PUT, and DELETE [11]-[14]. In this study, JSON(*JavaScript Object Notation*) is a data format that we use for sending data from a WCF service to the client application.JSON is a data format in the form JavaScript code supported by the REST web service that is used for data exchange, in addition to XML and YAML [14],[15]. The reason we use JSON as the data format is because the machine has the ability to parse and generate the JSON format faster than the XML form[16]-[18]; it can lower data transmission time in the network and reduce the computational processing time at the client side [19].

Some previous researchers have conducted studies using WCF technology, including the research by [20] explaining that the WCF technology can be used on the Windows Phone 7 platform as a middleware that is able to distribute data from server application to the client application on Windows Phone 7.Next, similar research was conducted by [21] concerning the use of WCF in a Ubiquitous Computing environment for the distribution and integration of location data (GPS), messaging, friends, and the user so that a client application can be used by members to share a position using GPS and to share information between them.Subsequent research on the use of technology in education WCF was conducted by [22]. The study describes the use of WCF as middleware to integrate the presence of data students into the database server.Research into the use of technology in the field of robotics WCF was conducted by [23]. In his research, WCF technologies were used for remote access, authorization, multimedia streaming, and the servo control of the client manual control using 3 degree of freedom DirectX compatible joysticks. In terms of reliability and security of data transactions, WCF has better performance compared with its predecessor technologies, such as web services, NET Remoting, MSMQ, Message Pipelining. Testing the performance of WCF wasundertaken by [24].

2. Research Method

When developing this software, the researcher adopted the ICONIX method. The ICONIX method combines the classical or waterfall method and the agile method [25]. It startsby making a use case diagram, domain modeling diagram, robustness diagram, sequence diagram, and the last static class diagram. ICONIX is chosen because the development of theWCF application needs a lightweight software engineering method. ICONIX is already familiar with the technical team who built the software. Figure 1 shows the ICONIX method approach.
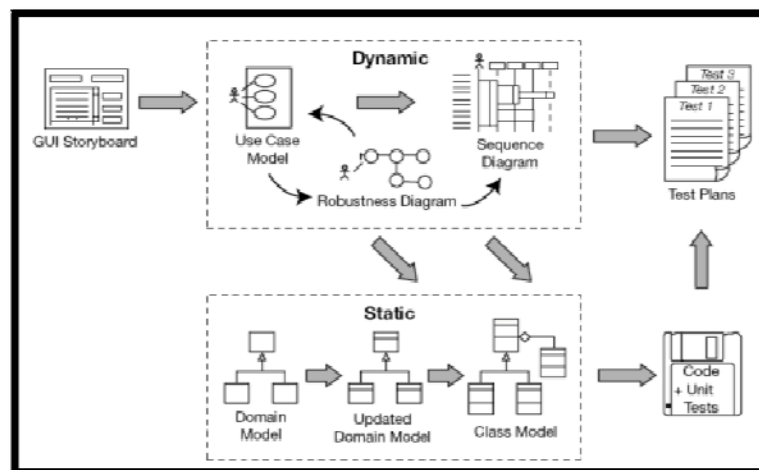

Figure 1. ICONIX Method [25]

3. Results and Analysis

This section explains the results of the research and at the same time provides a comprehensive discussion. Results are presented in figures, graphs, tables and others that allow the reader to understand easily[3],[5]. The discussion is covered in several sub-chapters

3.1. Use Case Model

Users can access information about tourism in Banyumas through the client application. Figure 2 describes the functional needs of the client application user.
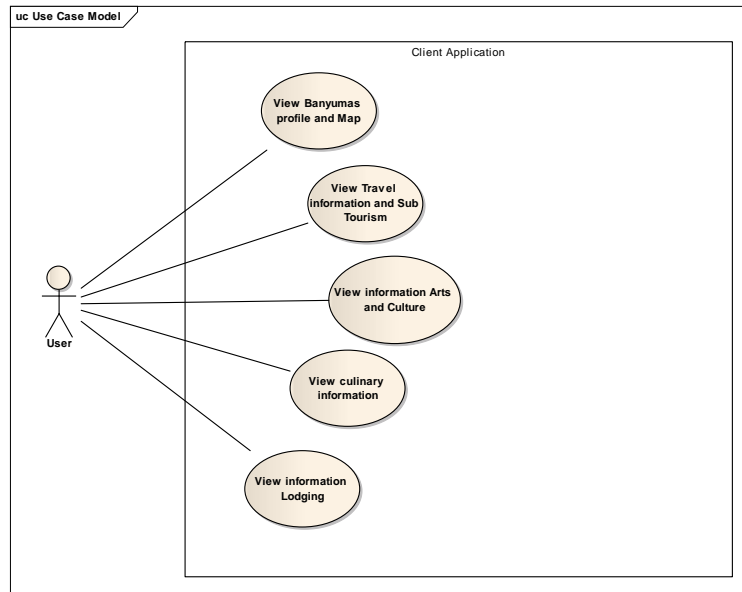

Figure 2. Use Case Model

Based on Figure 2 it can be seen that the client application offers multiple user access to tourism information in Banyumas, i.e. see profile information and geographical maps, see the information about tourist attractions, arts and culture, dining and lodging in the area of Banyumas.

3.2. Sequence Diagram

At this stage, we achieved the realization of the use case that includes the identification of objects and the relationships between the data objects, so the identification is able to provide the functionality of a use case based on Figure 2. There are four sequence diagrams based on Figure 2, a sequence diagram for viewing travel information and sub-tourism, viewing information on arts and culture, viewing culinary information, and viewing information on lodging.

Here is a sequence diagram for modeling to view information on arts and culture depicted in Figure 3, and sequence diagram for modeling to view information lodging is depicted in Figure 4.
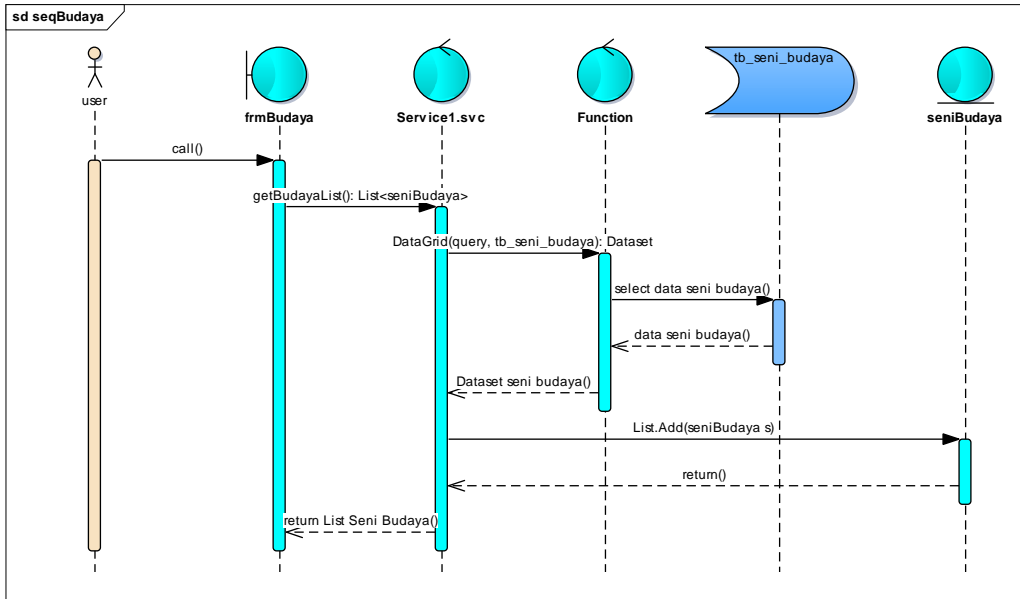
Figure 3. Sequence Diagram for Viewing Information on Arts and Culture

In Figure 3 the user application allows accessing information about arts and culture in Banyumas through the Control Class Service1.svc contained in the WCF Service. Accessing the service by calling the method getBudayaList is contained in that class. The service provides the return value in the form of a list of art and culture with a list of data types.
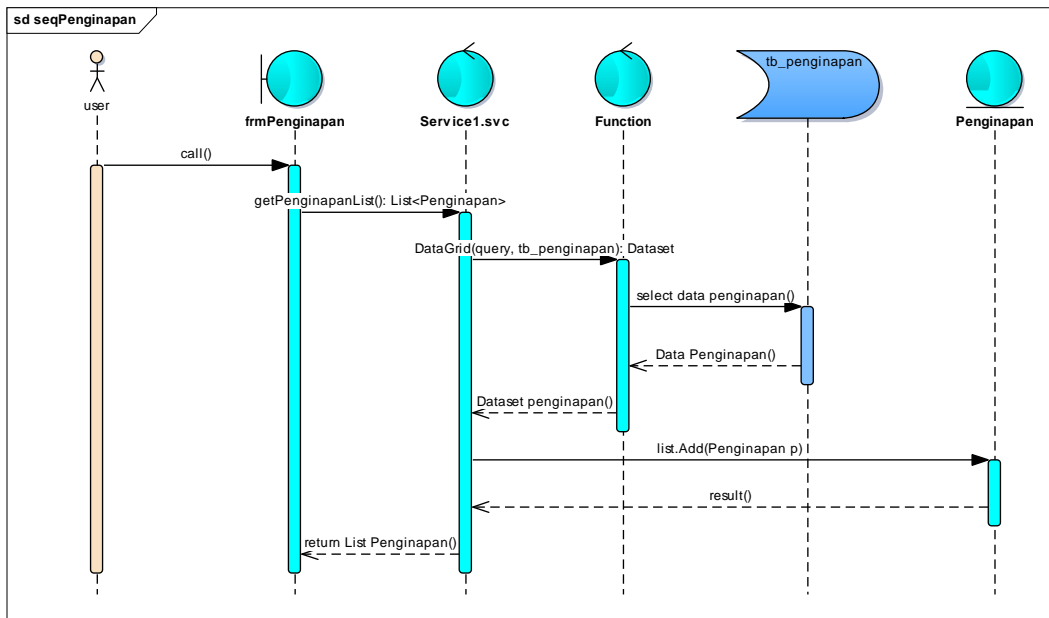

Figure 4. Sequence Diagram for Viewing Information on Lodging

In Figure 4, users access the service application information regarding lodging in Banyumas through the Control Class Service1.svc contained in the WCF Service. Accessing the service by calling the method getPenginapanList is contained in that class. The service provides the return value in the form of a list of accommodation with the data type List.

3.3. Class Diagram

Based on the sequence diagram modeling that has been done, there are three types of modeling systems, classstereotypes on Windows Communication Foundation, the Boundary class, class Control, and Entity Class. Table 1 explains the Boundary Class list, Control Class, and the Entity Class contained in WCF applications.

Table 1. Boundary, Control, and Entity Class List

Boundary Class	Control Class	Entity Class
1. frmPenginapan	1. Service1.svc	1. Lodging
2. frmBudaya	2. Function	2. artCulture
3. frmWisata		3. Tour
4. frmKuliner		4. SubTour
		5. Culinary

Table 1 shows that the WCF system has 4 Boundary Classes, 2 Control Classes, and 5 Entity Classes. Boundary Class is interpreted as the client desktop application interface that consumes services on the web service, Control Class is interpreted as the class that acts as a coordinator and control communication between objects of a class or object with the data storage, whereas the Entity Class is interpreted as the name of the table in data storage.

Based on the analysis of the sequence diagrams and class stereotypes that has been done, the class diagram in the WCF scheme can be modeled as shown in Figure 5.
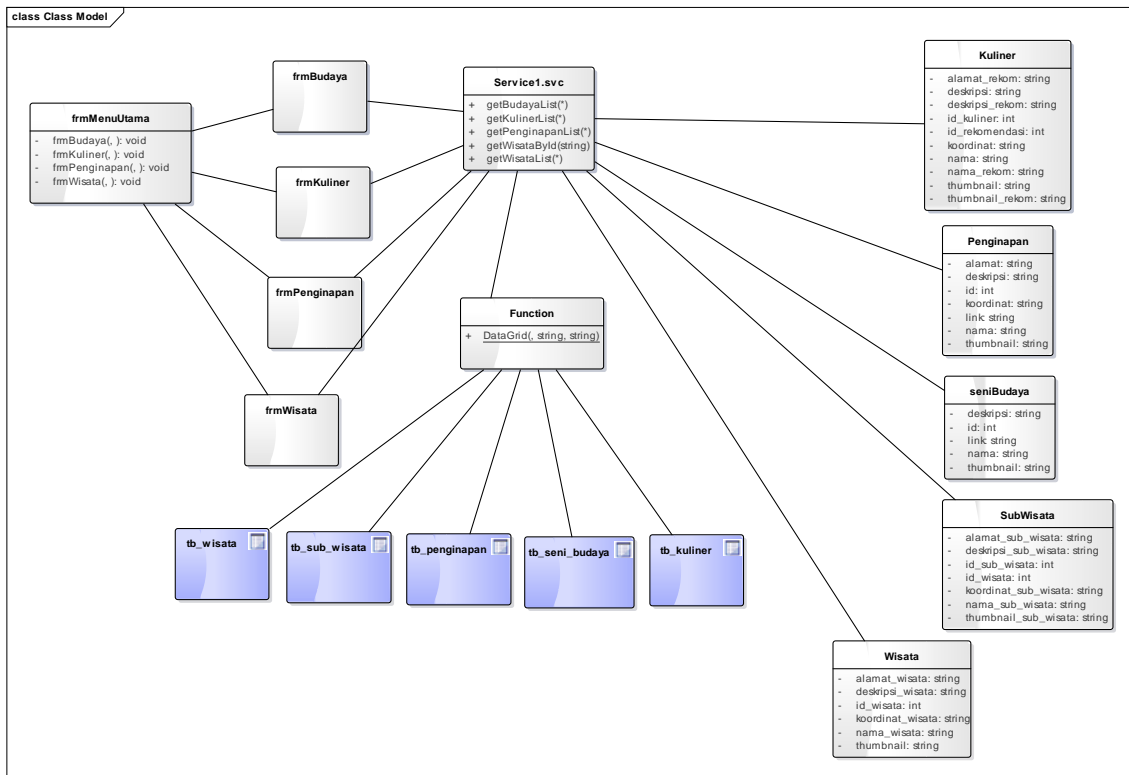

Figure 5. Class Diagram for WCF Application

3.4. Implementation
Scheme of the system used for the implementation of this study, described in Figure 6.
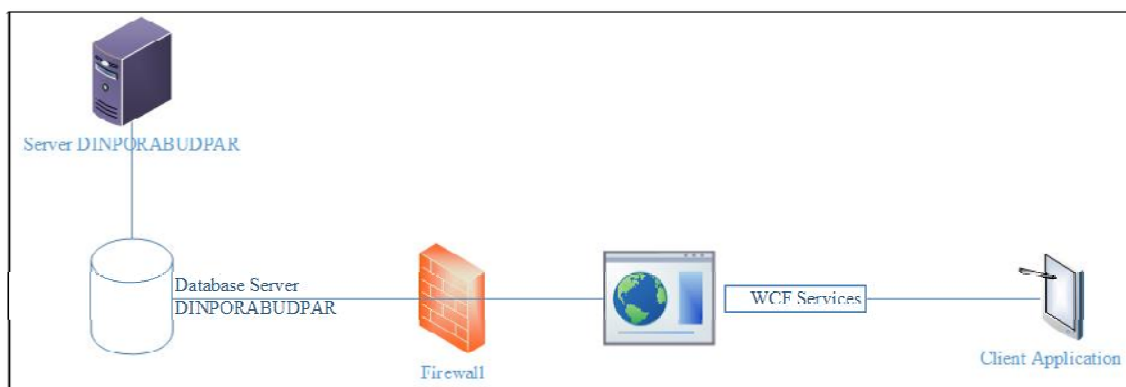

Figure 6. Scheme Information Systems Tourism and Culinary Services

Based on Figure 6 it can be seen that the application allows a client to obtain tourism and culinary information relating to Banyumas. DINPORABUDPAR is owned by the database server with the content and culinary tourism. The process of distribution of data between the client application and the database server using the WCF Service belongs to DINPORABUDPAR middleware.

Based on the analysis of the functional needs of the user, the client application has been described in the form of a use case diagram, as in Figure 2; then we create some of the services to be consumed by the client application. Table 2 presents a description of each service.

Table 2. Services Description in WCF

Protocol	Message Format	Service Name	Description
REST	JSON	getWisataList()	This service is used to download information about the list of attractions
REST	JSON	getWisataById()	This service is used to download information about the list of sub tours by certain attraction ID
REST	JSON	getBudayaList()	This service is used to download a list of arts and culture information
REST	JSON	getKulinerList()	This service is used to download a list of typical culinary Banyumas information and sales locations
REST	JSON	getPenginapanList()	This service is used to download a list of lodging information
SOAP	XML	DownloadFile()	This service is used to download the image data from the server

Based on Table 2 it can be seen that in this study we used two protocols for message exchange, REST and SOAP. As for the message exchange format, we use two formats, namely JSON and XML. Especially for the distribution of image data from the server to the client we use the XML data format with the SOAP protocol.

3.5. Testing
Testing against WCF services used REST Advanced Client, an add-on for the Google Chrome browser on the server side. Tests were conducted on service *getWisataList(), getWisataById (), getBudayaList (), getKulinerList (),* and *getPenginapanList ()* to determine

whether information about Banyumas tourism can be downloaded via these services. Table 3 describes the results of testing the service.

Table 3.Services Description in WCF

Service Name	Amount of data	Time	Conclusion
getWisataList()	4	1337 ms	WCF Data on the number of output equal to the amount of data in the database
getWisataById()	5	1125 ms	WCF Data on the number of output equal to the amount of data in the database
getBudayaList()	5	19 ms	WCF Data on the number of output equal to the amount of data in the database
getKulinerList()	5	1113 ms	WCF Data on the number of output equal to the amount of data in the database
getPenginapanList()	3	1139 ms	WCF Data on the number of output equal to the amount of data in the database

4. Conclusion

Once the research is complete, starting from the analysis of the system to testing the WCF as a middleware, then some conclusions can be drawn as follows:

a. The results of testing against WCF (Windows Communication Foundation) as a middleware between the client application with a web-based application system for tourism, show good results, so it can be concluded that the overall service functions properly.

b. There are five services available on the WCF service to meet the functional needs of the client application, which are a service to download data, cultural data, culinary data, lodging data, and downloading image data relating to tourism.

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