A procedural way for cross language communication using .Net and Android

Dr. Mijal Mistry
1Assistant Professor
Department of Computer Science,
Institute of Science & Technology for Advanced
Studies & Research, ISTAR
Sardar Patel University
V.V.Nagar, Gujarat, India

Abstract
Today, in the rapid changing world developer needs to think out of box solution for providing robust and scalable application. Earlier, the same application is developed in various platforms to address the need for current demand. Later on when maintenance part comes then it becomes cumbersome to remember and change each and every thing at all the location. This is not a feasible solution for all the application. In this paper I proposed a way to resolve this limitation. Here developer needs to change at a single location and that changes is affect to all the application whether it is a mobile, web based and so on.

Keywords: Android, WCF Service, HTTP, Cross Language, .Net, Mobile, Web

1 Introduction

Web service" as "a software system designed to support interoperable machine-to-machine interaction over a network. It has an interface described in a machine-process able format (specifically Web Services Description Language, known by the acronym WSDL).

2 WCF Service

Windows Communication Foundation (WCF) is a framework which is used for designing service-oriented web applications. Using WCF, one can send data as asynchronous messages from one service endpoint to another. [1] A service endpoint can be part of a continuously available service hosted by IIS, or it can be a service hosted in an application. An endpoint can be a client of a service that requests data from a service endpoint. [3] The messages that are retrieved are in form of as a single character or word converted into XML, or in binary data stream. [1]
It is unified programming model provided in .Net Framework 3.0. WCF is a combined feature of Web Service, Remoting, MSMQ and COM+. WCF provides a common platform for all .NET communication. [2]

3 Android

Android is an operating system primarily designed for smartphone devices. It is also considered as a software platform upon which applications are developed. Android hailed as “first complete, open and free mobile platform” [4] Android is an open source platform so no licensing or any other fees required for developing the application. Below figure shows the android architecture.
4 Implemented Model

Few times ago I came across a scenario where I have to perform the cross communication between two various languages. Earlier I have created one application based on .Net framework and it is on live server with working mechanism. Later on, a requirement came in which I have to developed an android application similar to the web application. Now I already have database, functions, webpages and methods calling mechanism implemented into the .Net. I do not want to create whole thing from the scratch for android. I research several options but was not able to fulfill the requirement. All the options I found show the use of Third party way to achieve the task. I do not want to depend on third party. Finally I implemented a new way of accessing the available .Net services on Android which do not depend on any other.

The procedure is divided into two phases. First part contains the creation of WCF service and settings the required attributes for the service. Second part is calling the service from Android application.

**Phase 1**

First I have created the WCF service in .Net which can be used in Android for accessing the data from the server. There are several namespaces required to include into the application, they are as follows.

```csharp
using System.ServiceModel;
using System.ServiceModel.Web;
```

There are few terms which can be used in WCF service, they are described as below.

[OperationContract] is used for WCF service for considering as syntax for the function. WebInvoke attribute defines the type of method, the Response Format, Body Style and the UriTemplate which contains method name and parameters (if any). It is declare into the interface so it does not contain the implementation. For implementation purpose WCF Service is created. Below code snippet shows it.

```csharp
[OperationContract]
[WebInvoke(Method = "GET",
ResponseFormat = WebMessageFormat.Json,
BodyStyle = WebMessageBodyStyle.Wrapped,
UriTemplate = "GetData/{id}" )]
string GetData(string id);
```

Above code is written for accessing the WCF service method in Android. Android understands JSON easily so response will be returned in form of JSON. UriTemplate is used for quering the server for getting the information. The method will accept the string parameter and based on that it returns the matching data. In android application, this method will be called and accept the returned value. Below phase 2 shows the approach.

**Phase 2**

This phase covers the logic for accessing the .Net services. The very first step required in android is giving the permission for accessing the internet into the Android manifest file. That can be done by below line of code.
Next, add below mentioned references into the application. They are useful for establishing the communication over internet.

```java
import org.json.JSONObject;
```

Now, form the URL on which the service is hosted. The URL is used for calling the method and passing the parameter to the server. The calling part returned the response from the server. The response can be converted either on XML or JSON. In this approach I have used JSON as response output. Below code snippet gives the idea about it.

```
DefaultHttpClient client = new DefaultHttpClient();
HttpGet request = new HttpGet("http://124.125.62.35/Service.svc/GetData/10");
request.setHeader("Accept", "application/json");
request.setHeader("Content-type", "application/json");
HttpResponse response = client.execute(request);
HttpEntity entity = response.getEntity();
```

As one can noticed into the above code snippet that response format is set to JSON in form of setting the header property. HttpGet class object is used for getting the output from the mentioned URL. HttpEntity class object accepts response from the server. Once result is get it will be converted into string format from JSON and displayed as a Toast. Below figure shows the output.

![Figure 3 Response from WCF Service in Android](image-url)
This is how the task can be accomplished for various language communications.

5 Advantages

There are several advantages using above mentioned technique. They are listed below.

- Interoperable
- Reliability
- Security
- Integrated logging mechanism
- AJAX and REST Support
- Multiple Transports and Encodings
- Data Contracts

6 Conclusion

This approach shows the way of cross language communication. It also shows that there is no need to depend any third party controls or approach for achieving the task. One needs to be cautious while using the approach as the attribute values should be set in such a way that the data cannot be discarded and full result is received. In this way the target can be achieved.

7 References

[4] Android wireless application development by Lauren Darcey & Shane Conder from Pearson Publication