A Sophisticated Approach for the Integration Of .Net Framework and Google Maps Using Mashup Technology

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Abstract
Mashups are a current endorse that is attracting high interest by academia and industry now and in the next years. The basic idea of a mashup is to create new content by reusing and combining existing content from heterogeneous sources. Mashups technique provides a new platform for different data providers to flexibly integrate their expertise and deliver highly customizable services to the customers. In this paper, an innovative approach is proposed to build mashup out of heterogeneous sources of effective data. The design of mashups engrosses integration of heterogeneous data and be an adjunct of new applications from existing infrastructure. In today's world, implementing distributed systems that provide business value in a reliable fashion presents many challenges. This paper discusses the challenges and design and integration of resources. This paper presents an analysis of the Windows Communication Service (WCF) using the Mashup concept. The paper gives the demonstration of integration of Google Maps with the services defined.

Keywords
Mashup, Google Map, .NET Framework, ASP.NET, WCF.

1. Introduction

Mashup is a web application that combines data from one or more sources into a single integrated tool. The basic idea of mashup is the integration of different resources. Mashup is a web based application that is created by combining and processing on-line third party resources, which contribute with data, presentation or functionality [1].Online third party resources refer to any type of resources available in the internet, independently of the format in which they provided. As a result, a mashup provides a new resource not conceived by the original combined resources. Web mashups, a concept and technology for mixing content and applications on the web, have a huge potential to establish a new way of marketing between the lines. A broadly used opportunity is to integrate freely available services such as Google Maps, the most used API for web mashups with the traditional content on a company's website to create addition benefit for the user. Technically mashups are designed to implement server-side style or client-side style.

In today's world, implementing distributed systems that provide business value in a reliable fashion presents many challenges. For an instance consider the loss of connectivity that leads to data being lost or corrupted and other aspects such as tightly coupled systems the dependencies between the various components of a system make it cost prohibitive to make changes as needed to meet the demands of the business. Business processes quite often are supported by systems that are running in different platforms and technologies both within and outside the organization. Service-Oriented Architecture (SOA) is mechanism that enables organizations to facilitate communication between the systems running on multiple platforms. Service-Oriented Architecture is a collection of well-defined services, where each individual service can be modified independently of other services to help respond to the ever-evolving market conditions of a business. Unlike traditional point-to-point architectures an SOA implementation comprises one or more loosely coupled and interoperable set of application services. Windows Communication Foundation (WCF) is a framework for building service oriented applications. This paper discusses the integration of WCF services and displaying the location information using Google Maps API.

2. Theory

A. ASP.NET

ASP.NET is a server-side web application framework designed for web development for the creation of dynamic web pages. ASP.NET was developed by Microsoft to allow programmers to build dynamic websites, web applications and web services. ASP.NET is designed on the Common Language Runtime (CLR), allowing programmers to build the ASP.NET code using the .NET supported languages [2]. ASP.NET includes the features

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that facilitate to add the data access to the web pages. ASP.NET is a unified web development model that includes the services necessary to build enterprise-class web application. ASP.NET is a part of .NET Framework and when coding ASP.NET applications one has to access the classes in the .NET Framework. The applications can code in any language compatible with the Common Language Runtime (CLR), including Microsoft Visual Basic and C#. This language enables to develop ASP.NET applications that benefit from the Common Language Runtime, type, safety, inheritance and so on. The selected language to develop the application is the C# [3]. ASP.NET web pages, known officially as web forms are the main building block for application development. Web forms are contained in files with a ".aspx" extension, these files typically contain static HTML markup, as well as markup defining server-side web controls and user controls.

B. Windows Communication Foundation (WCF)

Windows Communication Foundation (WCF) is a framework for building service-oriented applications. Using WCF one can build secure, reliable, transacted solutions that integrate across platforms. WCF is a programming platform and runtime system for building, configuring and developing network –distributed services. It is the latest service oriented technology. Interoperability is the fundamental characteristics of WCF. WCF is a unified programming model provided in the .NET Framework 3.0 [4]. WCF is a combined feature of web service, remoting, Message Queues (MSMQ) and COM+ .WCF provides a common platform for all .NET communication.

The below figure shows the different technology combined to form WCF.

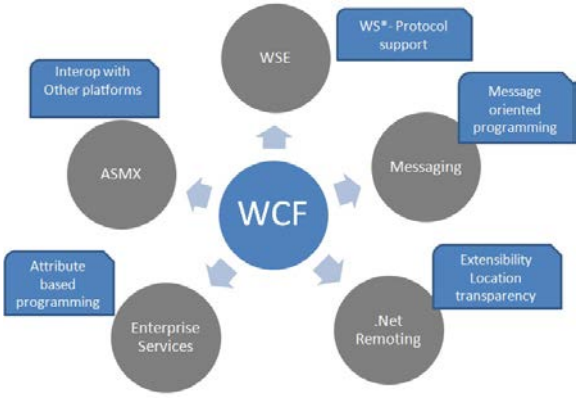

Fig 1: WCF technology

Windows Communication Foundation (WCF) can send data as asynchronous messages from one service endpoint to another service endpoint. Service endpoint can be part of a continuously available service hosted by Internet Information Server (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. The messages can be as simple as single character or word sent as XML or a complex as a stream of binary data.

WCF interoperate between WCF-based applications and any other processes that communicated via Simple Object Access Protocol (SOAP) messages.

Incorporating security and privacy into a web service and client application is a non trivial task. To make life easier for developers building web services using the Microsoft .NET Framework, Microsoft introduced the Web Service Enhancements (WSE) packages. WSE is a fully supported add-on to Microsoft Visual Studio, designed to help to create web services that retain compatibility with the evolving web service standards. By using Visual Studio, the .NET Framework and WSE one can quickly build Web Services and client applications that can communicate and interoperate with web services and client applications running on other operating systems. Web Services are one technology that one can use to create distributed application for windows the other applications include Enterprise Services and .NET Framework Remoting and Message Queues (MSMQ). The main intention of WCF is to provide a unified programming model for many of these technologies, enabling to build applications that are as independent as possible from the underlying mechanism being used to connect services and application together.

Windows Communication Foundation (WCF) is all about communicating. In stand-alone application like XML Spy or Notepad it would not generally use services. WCF handles the communication infrastructure of Windows Vista and has been extended to Windows XP and Windows 2003 through the .NET Framework 3.0 .The .NET Framework 3.0 is a managed programming model for Windows that is designed to replace the Win32 Application Programming Interface (API). WCF provides the communication infrastructure that allows creating multifarious range of applications through the simplified model. Based on the notion of services, WCF contains the best features of ad hoc distributed technology stack to develop the connected systems.

C. Google Maps API

Google Maps is a web mapping service applications and technology provided by Google, which powers many map-based services, including the Google Maps Website, Google Ride Finder, Google Transit and maps embedded on third party websites using the Google Maps API. It supports the street maps, a route planner for travelling by foot, car, and bike or with public transportation. Google Maps satellite images are not updated in real time, the images that are displayed are several months or years old.

The images of major cities and frequently visited locations are updated frequently. Google Maps uses the close variant of the Mercator projection.

Google Maps API (Application Programming Interface) is a free service created by Google providing developers with the capability to integrate Google Maps into their websites [5]. The Google Maps API accords website developers to integrate mapping capabilities into their websites. Google Maps API is used to embed Google Maps into web pages and customize the website. The map is used to display the information if different places within the location. These markers are clickable to display the information of the particular zone.

Google Maps API v3 is the current version. Google Maps API v2 is deprecated. The version 2 is released before the smart phones became the everyday device. The version 3 is much lighter and faster and it is specifically oriented towards mobile devices and supports to work fine with the personal computer.

3. problem space

The exchanging of data and services in the traditional web portal systems are problematic as they are closed and rigid platform with tight rules. Processes are rapidly changing in business and processes are getting more complex, requiring multiple users from different management levels to participate and collaborate to address the complexity. Businesses exigency to scrutinize the potentialities for enhanced virtual operation, through the use of the emerging technologies such as Mashup. The personal learning environment and course management presents a better way for managing complex learning resources from multiple sources. In the business ambit, customer's demands are changing as well as market places, competition and business partners. The advantage is conferred by the innovative use of new technologies rather than their mere presence. Such attributes involve business problems may be solved in dynamic way however the current web development technologies do not yet fully support such type of services solutions.

Existing technologies strengthen the requirement to provide more design middleware and replacement of old systems. Rather than being about remixing the old applications in a new way, it is about remixing the system solutions. The remixing of system solutions derives services from businesses existing services. Therefore, increasing its ability to cope with change through, empowering end-users and enabling innovative concepts. Mashups offer flexible composition of business existing services within an improved user interface environment through the improved API's suitable for end users in their context of use.

4. Integration of wcf Services and google maps using mashup technique

A. Creation of WCF Service

The creation of WCF Service and client applications involves a series of steps. A service exposes one or more endpoints, each of which exposes one or more service operations. The endpoint of a service specifies an address where the service can be found, building that contains the information that describes how a client must communicate with the service, and a contract that defines the functionality provided by the service to its clients.

The steps involved in the creation of WCF Services are

Step 1: Defining a Windows Communication Foundation Service Contract.

Step 2: Implementing a Service Contract.

Step 3: Host and Run a Basic Service.

Step 4: Creation of Client.

Step 5: Configuration of Client.

Step 6: Usage of Client.

The first three steps describe the creation of a WCF Service. The service that is created is self-hosted within an application. Services can also be hosted under Internet Information Server (IIS). The next three steps described the creation of client proxy, configuration of client application and use the client proxy to call the service operation exposed by the services. Services publish metadata that define the information a client application needs to communication with the service.

The creation of a WCF Service includes the defining of Service Contract. The Service contract specifies the respective operations that the service supports. An operation is a web service method. Contracts are created by defining a C# interface.

Each method in the interface corresponds to specific service operations. Each interface must have the Service Contract Attribute applied to it. If a method within an interface that has the ServiceContractAttribute attribute does not have the OperationContractAttribute attribute the method is not exposed by the service. The methods in the example are GetLocations and GetLocationInfor based on the selection of the location.

The service is created for a sample database, where the database contains the information of locations and important places of the location. On selection of the location the places information of a particular location are displayed on Google Maps.

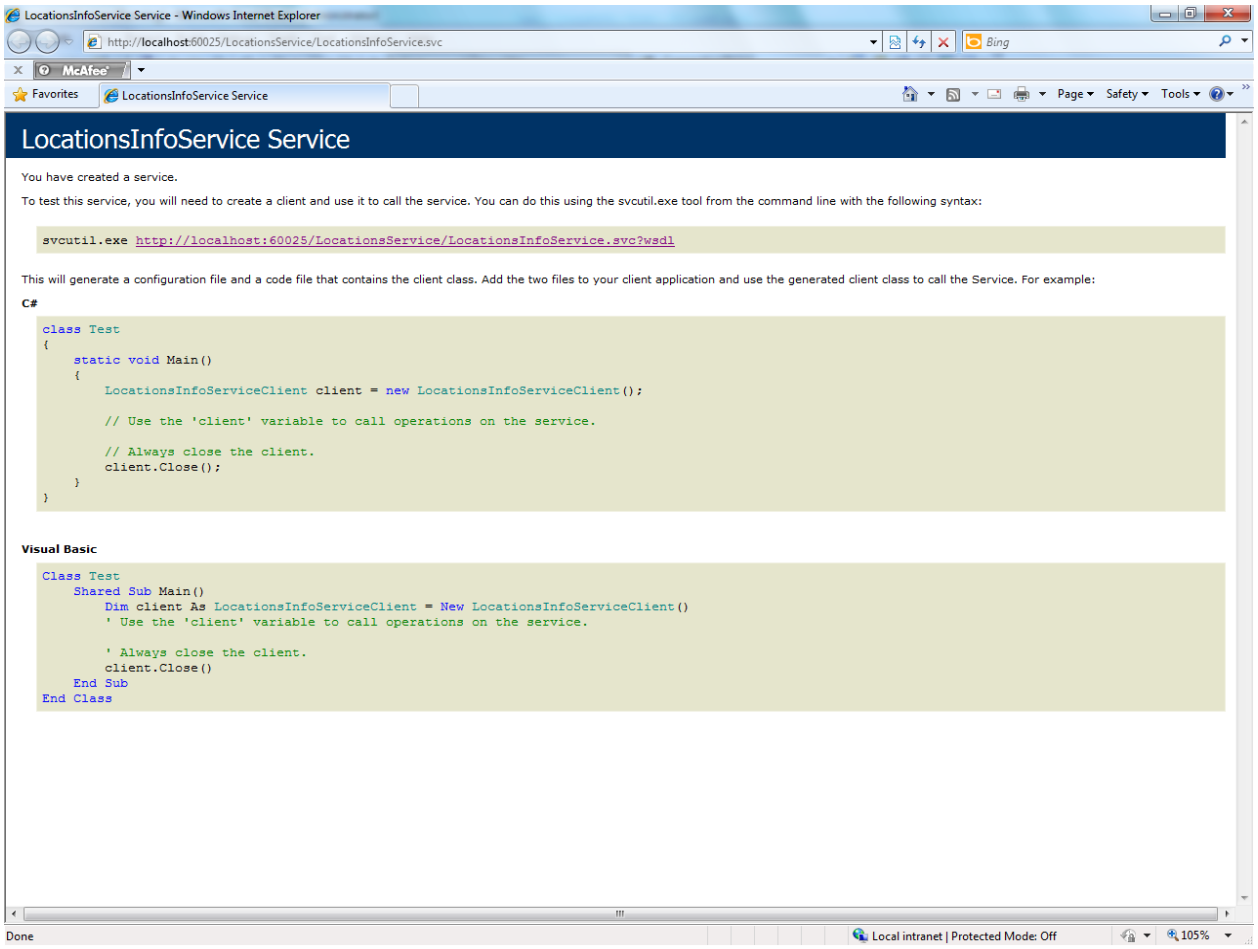

Figure 2: WCF Service

Figure 2 describes the creation of a serivce. The LocationInfoServiceClient is used in the application for accessing the services.

B. Creation of Client Application

The ASP.NET webpage to integrate the services with the Google Maps. The Creation of webpage includes the importing of the Service references after adding the service references the application can use the service. The first page contains the information of locations where users need to select. The second page contains the Google Maps that display the places information based on the selection of the user.

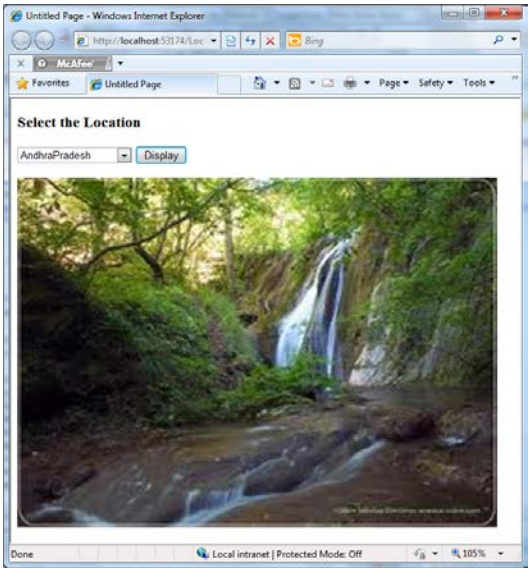

Figure 3: Client Application

Figure 3 shows the web page that contains the location information like the states of India, the information is retrieved from the services created by using the reference to the service.The services can be used by creating a client in Th client application referencing the service. The client created in the client application is used for the retrieving the specific function that are defined in the service.

The selection of a particular location results in web page that gives the detailed information of a particular location by displaying the places on the map. API key is required to embed the Google Maps in the web site. Too asynchronously load the Maps API, in the client side scripting of ASP.NET Javascript code must be injected.

The Google Maps API version 3 is used for the diplaying the Google Maps. The API provides services like Geocoding the address, Overlays, Events, Controls, Styles and Layers.

A typical web service request is of the form "http://maps.googleapis.com/maps/api/js?v=3.exp& sensor=true". The usage of Google Maps API indicates whether the application use the sensor such as GPS locator to determine the user's location in the Maps library or service requests. This is important for the mobile devices. If Google Maps API application uses any form of sensor to determine the location of the device accessing the application then the sensor parametes must be set to true otherwise it is false.

Geocoding is the process of converting address into geographic coordinates that are used to place markers or position the map. Reverse geocoding is the process of converting geographic coordinates into a human-readable address. The Google Geocoding API provides a direct way to access these services via a HTTP request. Overlays are objects on the map that arre tied to latitude/longitude coordinates, so they move on dragging or zooming the map. Ovelays reflect objects that add to the maps to designate points, lines, areas or collection of objects. The map API has seveal types of overlays the locations on the map are displayed using markers. Markers may sometimes display custom icon images, usually they are referred to as "icons". Markers and icons are the objects of the type Marker. Lines on the map are displayed using polylines. Lines are objects of type Polyline. The polyline class defines a linear ovelay of connected line segments on the map.

The Geocoding request is accessed using the geocode where the geocode is the method of the type Geocoder. The properties of the Geocoder are the address, bounds, locations and region. The path is the property of the Polyline class that connects the line segments on the map. The other properties of the Polyline are strokeColor, strokeCapacity; stroke Weight .The setMap is a method of Polyline that renders the specified shape on the map. The setContent and the Open are the methods of the InfoWindow class for the displaying of the information window.

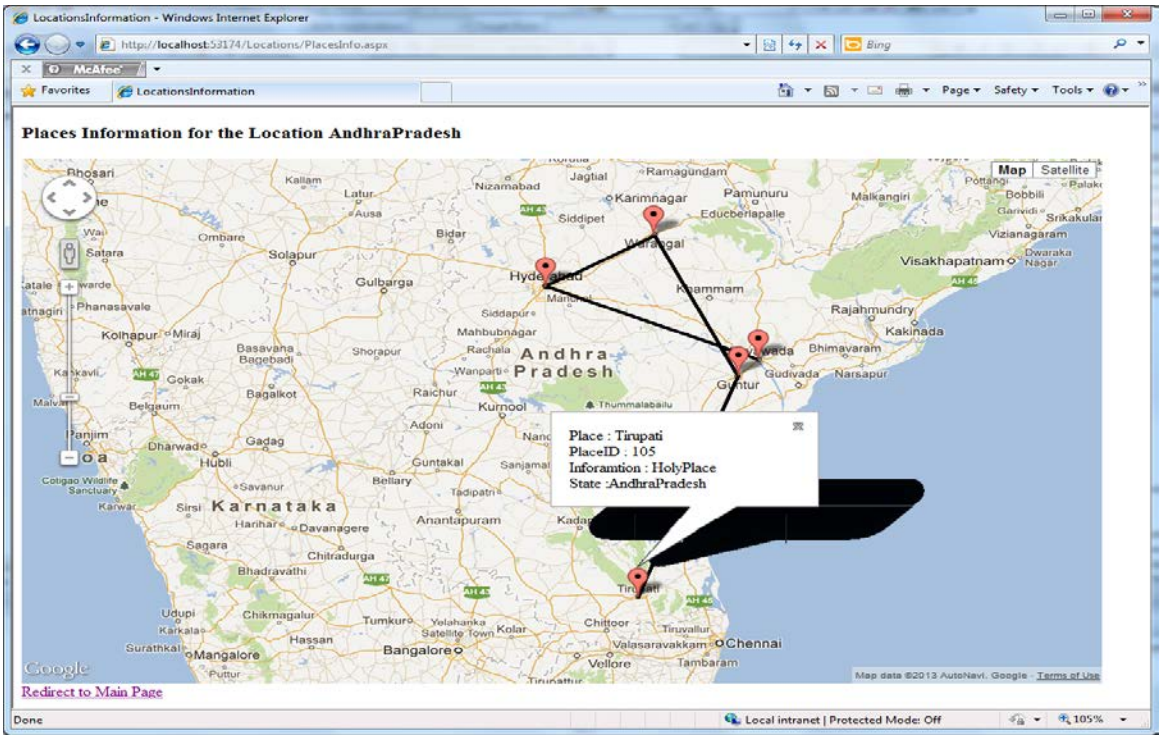

Figure 4: Displaying Information using the Services

Figure 4 shows the Google Map that contains the places in the location that selected by the user. The selection of the Andhra Pradesh results the above map. The different places in AndhraPradesh are retrieved using the services. By clicking on the marker at the particular place the information about the place is retreived.

Conclusion

This paper apostle a mashup approach of integrating WCF Services, ASP.NET and Google Maps together to form an intelligent smart working business application. This application is easy for the user to use and access the data. The mashup technology plays a vital role in building a business applications.This intelligent mashup will integrate both the server and client side processing. The main contribution of this paper is the integration of the emerging technology in the form of mashups to better support the requirements of the user for up to data and interactive websites. This paper have compendium of how a mashup approach can be applied to overcome the limitations of current virtual organisations based on distributed architecture and without provision for directed data sourcing at the user layer. This paper discussed about the creation of services, the implementation and use of the services at client side and displaying the information on Google Maps.

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