A Model for Web developer to overcome the Cross Platform Dependency in Mobile Technologies

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Abstract - Most web developers has problem in building native mobile applications, requiring varied knowledge, skills and forced to change their platform. The technology is growing rapidly and fast enough, for web developers, to keep them up to date with it. Cross-Platform apps for mobile are also in use but they don’t target web developers. The core objective of this research is to design a Transition Model that will help web developers in deploying mobile applications with their native coding conventions like: HTML, CSS and JavaScript/jQuery. A Web developer, who needs to create cross-platform applications for multiple mobile, can use this Model to build. The Model is open source and described in detail for future research as well.

Keywords -Open Source Model (OSM), jQuery Innovation,Cloud Computing,Cross-platform Dependence.

I. INTRODUCTION

This research work is based on an open source model which describes an Integrated Model to overcome Cross-platform Applications in the field of Mobile Technology. Mobile Web Development using the feature of JQuery is one of the core technologies at this time and its UI framework is created for exactly this purpose [1]. This technique provides web developers an ease that anybody who is a web developer can make a mobile application without converting native language and platform [1]. The future of mobile native apps is shifting towards [1]. In addition to mobile Narrow Layout, there exist several methods for handheld devices that apply the Overview plus Detail method [2][1]. These Views can be shown separately by overlapping them [3][4][5]. And jQuery can perform this overlapping with enormous efficiency. By combining these features, a useful GUI based apps can be made that overcome even cross platform development. The Proposed model contains the lightest internal database called extensible Markup Language (XML). [6][7]. Based on such observation, many publications followed with the goal of storing and querying XML documents using relational databases[7][8][9][10]. Model core part is integrating web features and XML plays a key part in model as an offline computing technique. Cloud Computing is becoming the headline in this era of technology [11], and model also automatically implements the concept of cloud computing as well. All the data placed on the cloud and it will use less resources of the mobile in capacity and makes it more secure.

Mobile Applications are famous for their multimedia approach, User friendly GUI’s, Security and High Performance with large capacity and jQuery libraries provide all these features to facilitate with web and develop mobile applications. Integrating Web Application as a mobile native application in web capable devices like : iPhone, Blackberry, Tablet PCs, Android and Nokia Mobile Devices. Using the features of latest technology (cloud computing) and some old techniques (XML based internal database). Make the mobile application experience even better for Web developers. Transition model which facilitates the researchers and web developers and proposed a new idea. Combining the latest and old technique to make web a heaven for web developers. Focusing on web capable devices, the browser based mobile application plays a key role in mobile technology. Mobile Applications are becoming the market trend and Mobile Developers are becoming the highly paid programmers and even leaving Graphics programmers behind [12]. “Code once and deploy maximum” is now the latest technology in the era of Mobile Technologies. The Technologies like: Sencha, Qt Development and Nokia Web software development tool kit (SDK) provides the ease for developers to code their Logics and Ideas in more than One Device. They come up with great presentation for the Fresher Programmers but not for Old Native Application Oriented Programmers because Old Programmers should leave their Native platform and Code and convert to a latest technology about which they don’t have clear views, whether the technology survives or not, whether the technology becomes popular and make a mark or not?

This hesitation to choose or not to choose is the main issue for native Platform developer. Web Developer has to change their coding conventions in order to shift to cross Platform development. This research is to design a Model that fulfills the need of web developers. This proposed model will helpful for web developers to make suitable software for web-capable devices. As we are following the cross platform, this proposed model will not only become the base for only a particular device but also smart mobile handsets. This proposed model is not only supports Nokia, Apple or Blackberry handsets but it
will surely enhance its library. This is a plus point for the proposed model that whether technology increases or changes its strategies but the model will not change. And it will also continue the research. This model is web browser based so, it is difficult to access hardware of smart devices, like: (Camera), due to less work in this technology. But as more awareness will spread in developers the work increases and it will overcome this limitation very soon. JQuery is growing very fast and is very close to hardware language. It will surely handle mobile hardware efficiently. My work should be seen as an experimental research project and is not meant to completely substitute traditional techniques. In my opinion today’s development standards are subjected to firmly adopted programming methods, which hinders us to look beyond certain patterns. This research is indicates the advantages of Web browser aspect to modern technology. Every Smart phone has a web browser and proposed model is the best option for a Web Developer to program any software by using browser resources like: html, css and js/JQuery. Cloud computing can be used in order to handle large amount of data virtually Microsoft Office, has moved in part to the Web. These coding conventions can overcome the problems. This Model is a cross platform mobile framework designed to simplify and enhance the development of mobile web applications by integrating HTML, CSS3, jQuery and jQuery UI into one framework that is not only robust, but maintainable and organized. This Model is compatible with all major mobile and desktop applications including iOS, Android, Blackberry, Palm Web OS, Nokia/Symbian, Windows Mobile, Opera Mobile/Mini, Firefox Mobile and all modern desktop browsers.

II. METHODS

Consumers are changing their behavior and expectations with regard to ordering and brand loyalty. There are over 3 billion mobile users across the globe. This means that over 2:5 of the world’s population carries a mobile device, far more than use a computer or have access to the internet [13]. Integrating desirable features into the Web is an important aspect of making them accessible [14]. The concept of code once and deploy more is one of the biggest achievement in the history of Mobile technology.

A. STRUCTURE OF XML

The Extensible Markup Language (XML) offers many important benefits and improvements over its predecessor, HTML. XML can greatly facilitate this process by providing more syntactic structure to web documents [17] [6]. Many XML documents will be transient representations for the purpose of data exchange between different types of applications [15] [14], but there will also be a need for effective means to manage persistent XML data as a database.

As the situation with dynamically created HTML web pages, in the new areas there is not must a need for precise storage of XML documents [7].

XML document database (or more normally an XML database, every XML database must manage web contents) to be a collection of XML documents and their parts, maintained by a system having skills and capabilities to manage and control the collection itself and the information represented by that collection. As is true for maintaining other forms of information, management of persistent XML data needs skills and abilities to deal with data independency, versions, consistency, views, integration, access rights, redundancy, recovery, and standards [6] [7] [14].

B. INTRODUCTION TO WEB SERVICES

A Web service is a software application that is identified by a URI (address of a web page), whose interfaces and bindings are capable of being managed, described, and created as XML documents [19]s. A Web service supports direct interactions with other software applications using XML based messages exchanged via internet-based protocols [18] [20]. Web Services aim to enable application-to-application interactions on the Web and integrate the existing network computer infrastructure into the Web. Four basic technologies facilitate Web Services:

XML (Extensible Markup Language) is a format for data exchange and descriptive, improving marshalling and unmarshalling. It provides support between different platforms.

SOAP (Simple Object Access Protocol) is protocol based on XML to invoke services, it supports both synchronous and asynchronous call semantics and it can be used with HTTP or other protocol.

WSDL (Web Services Definition Language) is on XML vocabulary to describe operational information about services.

UDDI (Universal Description, Discovery and Integration) is a registry for registering and finding Web Services.

C. SECURITY OF WEB SERVICES

A basic principle of security is the need to secure all the levels involved in the Web Service. Any weak part will allow malicious objects to penetrate/damage the system. These levels include:

- Workflow or business process level
Cataloguing and description of web services
Communication level (typically SOAP)
Storage of XML document

These are the points that have an effect on the security of Web Services. Web Services are internally a very strong technology and their use will continue to increase [16] [21]. However, it needs to be aware of the potential security problems that may occur. There will be new problems. Currently, the Internet is not a secure place. Further, cryptographic measures have resolved some of the important security holes, such as authentication of a user, message confidentiality, signatures of users, and non-repudiation, and all their power can be supplied to Web Services as well [16] [17]. The W3C consortium is responsible for the development of the following security related XML technology standards: XML Encryption; XML Digital Signature; and XML Key Management System. SOAP [SOAP11, SOAP12] are the extensions that can be used when creating Web services to implement message content integrity and confidentiality. This specification refers to this set of extensions and modules as the “Web Services Security: SOAP Message Security” or “WSS: SOAP Message Security”. This specification is more flexible and is designed to be used as the basis for security of Web services within a wide variety of security models [18].

jQuery introduced pretty cool things rapidly not allowing developers to think on other 3rd party toolkits like AJAX. XML file is the only powerful text based file that can be handled/parse in every core platform whether web or native app. XML offers many important benefits and improvements over its predecessor, HTML [6] [7]. Storing data in the form of XML files allows doing Offline computing in different applications like saving all saving emails. The plus point is that the XML file can be parsing in every type of programming and web uses it efficiently. Based on such observation, many publications followed with the goal of storing and querying XML documents using relational databases [8] [7] [10]. Data Security will be high as Cloud computing is involved. All user data save on internet, in encrypted form. Cloud computing allow to save unlimited data, without using a single resource of a mobile device [11].

D. INTRODUCTION TO JSON

JSON (JavaScript Object Notation) is a light weight content that is used for data exchange. It is also a subset of JavaScript's Contents (the way objects are built in JavaScript). It is derived from the JavaScript scripting language for maintaining simple data structures and arrays, called objects. In the general meanings, the JSON Rules engine will come as part of the accessed information [21]. Along its concern to JavaScript, it is independent from language, with parsers available for different languages in different styles. The JSON format is mostly used for serializing and forwarding structured data over a network. It is used primarily to transmit data between a server and a web page that acts as an alternative to XML. The lifetime of the rule engine is in the implementation scope of the lifetime of the current DOM object inside the browser [21] [23]. Using the engine is easy. At the start, one must load the engine.

E. JSON WITH JAVASCRIPT

Working with JSON with JavaScript, you may be forced to use the “EVAL” function to evaluate the result that comes out in the callback, but this is not highly suggested due to security purposes (malicious or irrelevant data can be sent from the server to the client side and then “EVALED” in the client side script with harmful effects). Therefore, developer in this stage must always try to use Crockford's script that checks for a authenticated JSON before evaluating it. The JSON Parser also offers another very useful method that is called “Stringify”. This method accepts a JavaScript object as a parameter, and gives outputs back a string form with JSON. This is useful when developer want to send data to and fro with the server. JSON is a simple way of serializing in such a way, that it becomes client side JavaScript code. When executed (with EVAL or other method), this code creates and returns a JavaScript object. This then contains the data Developer serialized. This is available because JavaScript completely allows it.

F. THE WORKING MEMORY

This is represented by the DOM object of the current display page [22] [23] [24]. The Working Memory is special in itself because it is event based, DOM can be changed through events.

G. THE INTERFACEENGINE

This is the “brain” of the system. It is mostly based on the (DOM) of the Working Memory and based on the current viewable page corresponding rule set, it performs the matching operation and executes rules [24].

H. THE EVENT MANAGER

The event manager is a combination between Client Side script and Working Memory [22] [23]. DOM object of the
current page. The Event Manager takes advantage that the DOM itself is event based. All changes occur and in mostly all DOM events are assumed to the main document object. This is based on the bubbling effect of DOM events [21] [23].

JSON Rules provides the JavaScript engine with reasoning capabilities and the users can write their custom rules [24]. The rules syntax is based on JSON notation, therefore does not require high effort to accommodate it [21]. Rules are simpler but powerful, their main goal being to change the DOM of the page they apply. The major goal is to make a mobile application without using native or cross platform Toolkits. Focuses on Web developer, using a Web browser in web-capable devices, a Web developer can make large, scalable and useful application for mobile without converting or shifting their native platform. In order to achieve this goal, this research combines some of the old parts and some new technologies to overcome this drawback.

III. FOUR- TIER STRUCTURE MODEL

The Model structure depends on four layers namely: Front-End, Communication, Web Server and Backend layer. Each layer has its own functionality and specification. The layers coordination is efficient and covers a wide range of simplicity, performance, security and GUI’s and Database safety as well. Following is the detail configuration of each layer.

A. FRONT-END LAYER

JQuery has long been a popular JavaScript library for deploying much faster and effective websites and web applications that has a very useful GUI. However, since it was designed especially for desktop browsers but its great GUI provides the best views in Mobile Browsers also. As this library is open source, so it’s a great chance to enhance it and make it more reliable and efficient. The interface manipulation is markup based, which means you can pretty much create your entire native application interface in HTML. The library provides a branch of custom events to let you detect mobile and touch specific actions like screen tapping, thumb tap-and-hold, thumb or finger swipe, and different dimensional change (i.e. rotation of a mobile) and It uses progressive enhancement to ensure that your app interface works on practically any web capable device. It also uses themes to make it easy to customize the look of your app. This Layer Based on the design pattern (HML, CSS & JS). JQuery also provides UI’s to build such a Native mobile like design.

Layout adjusted for especially mobile structures screens because mobile have limited resources and small screen size as compared to desktop PC. This kind of design fulfills the requirement of smart phone screens. In order to make the user experience as smoother as possible on mobile devices, JQuery uses Ajax to open all the interlinked pages by tradition. So, rather than a web browser following a link and opening it in a new tag, JQuery fetch the link, requests the page via Ajax, and resultant response is shown into the existing page’s DOM as a new page content. It also uses URL address to ensure that each page still gets its unique bookmark able URL. The result of this is that the user is always kept within the same main page. The contents of new pages simply appear within that main page. This results in a smarter and clean experience than the default approach of opening a whole new page, which typically responses in a blank screen and a few seconds of delay. The main page mostly stores the fetched information, making it much quicker to display the fetched pages when they are needed to be viewed next time.

B. COMMUNICATION/PARSER LAYER

This Layer is use to build SOAPS (WSDL Protocols to connect web servers). Basically, it is used to connect to web servers. The use of XML allows systems running different operating systems and programming languages to communicate by parsing XML requests and responses into their appropriate language equivalents. Fortunately, programming languages like C# (or any .NET language), Java, PHP, etc. support both clients and servers with Object Oriented layers called proxies that reduces the need to parse XML SOAP messages. JQuery is a best and fast source to connect through it.
It builds a XML Based SOAP and transfer it to the Web Server, where Web Server read that SOAP and use it in its own compiler.

**SAMPLE SOAP:**

```xml
<soap:Envelope
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
<soap:Body>
<CalcAreaResponse xmlns="http://example.org/geometry/">
<CalcAreaResult>2.76</CalcAreaResult>
</CalcAreaResponse>
</soap:Body>
</soap:Envelope>
```

**C. WEB SERVER LAYER**

This Layer consists of a web server that contains web services. Web services are basically, the part of cloud computing and plays an important middle ware ROLE to produce a connectivity between Front-End Layer to Backend Layer. Web methods parse the XML based incoming SOAP to Strings mostly and use these parameters to pass a Query/direction to the database. That tells the Backend Layer to what to do or what user wants.

**D. BACKEND LAYER**

This is Database Layer consists of databases that holds all the saved record and detail of each record. It has no size limit and excellent source for large data. It can maintain complex structure of data as it has the capability of relationships.

**Proposed Model**

**DESCRIPTION**

The major goal is to make a mobile application without using native or cross platform Toolkits. Focuses on Web developer, using a Web browser in web-capable devices, a Web developer can make large, scalable and useful application for mobile without converting or shifting their native platform. Combine some of the old parts and some new technologies to overcome this drawback, In order to achieve this aim. Today’s development standards are subjected to firmly adopt programming methods, which hinders us to look beyond certain patterns. This theory indicates the advantages of Web browser aspect to modern technology. The option for a Web Developer to deploy a mobile app is to use browser and program in html, css and js/jQuery, Cloud computing and XML based architectures. Code based on html, css will through the design layouts and jQuery/JS performs the User Interface (UI) actions making it more efficient and smooth. Data Connectivity can perform through Web Services via jQuery/JS using Standard Protocols to make it more secure. Actions perform by a Web server, which type of data, depends on the request, to save/retrieve. Database maintains all the data features as a Cloud Computing to help Web Developer in order to use as much less resources of mobile as possible. The Data will flow back to the application in encrypted form in order to maintain the privacy, especially for sensitive data. The data flows in the form of XML. XML is the lightest data flow technique based on plain text and can save as an internal database for the mobile. This will allow you to save the resources of the mobile and use just a plain text file as a DB. Web service plays the key role to connect the client side environment to server side. At the end data can be shown in a mobile web browser and with use of jQuery we can show it in a meaningful manner as per requirement.

**A. IMPLEMENTATION**

**EXAMPLE #1**

Saving an Image in a one way flow ,User saves an image into his account, like Native applications do.
DESCRIPTION:

1. Uploading an image with this user interface is quite complicated. But this technique fulfills the requirement. If User wants to upload an image, jQuery will provide accessibility to the Mobile camera. Taking a picture and ask the program to save it.

2. Convert the image pixels into bytes with jQuery UI libraries.

3. Send those bytes to the server by converting it in the XMP SOAP. WSDL protocols provide the security and serialize the bytes, which cannot be read by any other program. Web server read the bytes and deserializes the bytes in the form of appropriate image extension (e.g. Jpg, png, etc).

4. In order to save an image, Image cannot be saving directly into the database but path does. So, save an image into user directory, created on the Server for its future use. This is called cloud computing (saving information or data on a web server and access it on anytime, anywhere containing any device).

5. After making directory, save the path of the image in database. After validating the

6. Queries by the Database server, it saves the path. And if not validate then error report will be generated to the user. That tells the user to do the same.

B. IMPLEMENTATION

EXAMPLE # 2

CRUD (Create, Read, Update and Delete) Operations are the major part of any application. CRUD Operation is quite a normal flow. Model fulfills it with great efficiency and it can perform with internal Database as well as External Database. Data flow is the routine of any application. Here it performs CRUD Operations with External Database on the basis of Model Rules.

DESCRIPTION:

1. User can generate CRUD command by clicking on the button like: Add, Update or delete etc. it will generate an XML command with appropriate SOAP parameters.

2. Command send to the server by converting it in XML form with the security of WSDL.

3. Web Server then accept the SOAP and pass it to the appropriate Service after validation.

4. Web service then Parse the SOAP and read the data/parameters.

5. After parsing, a Command/Query will be generated which helps to communicate with the database records.

6. At the Backend layer, it validates the query and parameters.

7. If the query and parameters are valid then it will perform CRUD operation, whether it deletes, create, update or read.

8. If it fails to validate then a message will be generated which tells the user that some data/parameter is invalid or for some reason it cannot be gathered.

9. Here the reverse process took place. A message/data will be send back to the web service and after parsing the data/message it send back to the application for User View.

C. ADVANTAGES

1. One Time Coordination with clients

2. Cost Redundancy
3. Effort will be Reduced

4. Minimum Resources

5. High Performance

6. Size will be Reduced

7. No Need for Code Conversion for Web Developer

8. No Need to Leave Platform for Web Developer

V. CONCLUSION

Mobile Technology is the fastest growing network in information technology (IT) and the concept of Native Applications and Cross Platform Development are the ways to make it more enhanced but due to limitations of resources in Mobile, Applications cannot perform as much efficient Interaction with the Users. To overcome these Issues I introduce a more reliable concept with a Workflow Model for Web Developers to use their skills and compete with Application Developers without changing their coding conventions and without leaving their Native Platforms. This Model is a cross platform mobile framework designed to simplify and enhance the development of mobile web applications by integrating HTML, CSS3, jQuery and jQuery UI into one framework that is not only efficient and fast, but maintainable and well-organized. This Model is compatible with all major mobile and desktop applications including Apple’s iOS, Android, BlackBerry, Palm Web OS, Windows Mobile, Opera Mini, Firefox Mobile and all different modern desktop browsers.

FUTURE WORK

Authors are planning to develop a prototype based on the proposed model. So the non-professional web developers can also make the best from this research.

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