

PARSING OF XML FILE TO MAKE SECURE TRANSACTION IN MOBILE COMMERCE

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ABSTRACT

Mobile commerce M-Commerce is transaction using mobile devices. Now a day's users are dependable on mobile phone because of its anytime, anywhere features. User purchase and pay more with their mobile device than desktop. Therefore, the security of M-commerce transaction should be strong enough to enhance its performance. Mobile phones use WAP, i-mode and J2ME technologies for programming for making transaction. The data during transaction is sent as XML file. The XML processor takes more time to encrypt which leads to breakdown the security during transaction. This paper has defined the code to parse XML file which reduces its size so that data during transaction would be sent with ease and fast. The code is written in XML and J2ME as these technologies can easily run on multiple platform.

KEYWORDS : WAP,i-mode,J2ME,XML,Parser

1. INTRODUCTION

Mobile phones are emerging as ubiquitous technology in wireless environment. Ease of availability, uniqueness, small size and anytime work allow the user to use mobile phones more than desktop. Users take advantage of this aesthetic consideration. Mobile phones are using Wireless Application Protocol (WAP), i-mode and J2ME as protocols of programming for making transaction through mobile devices. WAP technology requires the network connection for any kind of data processing. The request is encrypted in WTLS and decrypted as TLS data which make encrypted data vulnerable. Yau and Lung (2006) in their study proposed that applications in **J2ME** offer more in terms of features and security than **WAP**. They have also explained that for high level mobile security code one should look no further than **J2ME** applications. In **i-mode**, digital radio packets are sent between handset and radio towers are encoded via a proprietary **DoCoMo** scheme. This information about this scheme is not available. Java platform makes users to develop portable code that can run on multiple platform. It has been designed to strike a balance between portability and usability. J2ME with XML overcomes the problem of Denial of Service and Non-repudiation attack. It parses the message to be sent to and by merchant so that only authenticated user can access the data. This process avoids stealing of PIN. Parsing of XML file with J2ME is done to provide more security during mobile transaction. This research paper has a pragmatic approach to secure adoption model for M-Commerce for generic mobile devices using **J2ME** with **XML**, where the parsing size of **XML** is reduced which makes secure transactions by controlling the delay and error in mobile transactions.

2. FEATURES OF XML REQUIRED FOR PARSING

In this web centric world, systems are designed with HTML browser as the client. The client functions as terminal and performs a very little of application processing. With the expansion of wireless world the server vendor serves WML over WAP and HTML over HTTP. XML

International Journal on Computational Sciences & Applications (IJCSA) Vol.3, No.5, October 2013 overcomes the limitation of HTML and protects the information distributed on web. XML has multi-tire structure to work with J2ME. Lee et al. (2004) in their paper has given multi-tier architecture of XML which described a standalone client which can communicate with the applications on server in different ways. The client can use RMI to manipulate the remote object and make HTTP connection. The main advantage of using standalone client than browser is the chance to provide a rich user interface whereas the main limitation is the difficulty of client installation and maintenance. XML can be used on different platforms such as UNIX, Linux, Solaris and Microsoft Windows. It can even work on mainframe systems. XML with J2ME plays an important role in protecting the data not only stored within devices but also data that transferred over the network. XML with J2ME provides security solution for confidentiality, non-repudiation, authentication and integrity. It has features such as flexibility, extensibility and compatibility which make its better use for secure transaction in mobile devices.

3. NEED OF PARSING XML FILE

The security of M-Commerce should be strong enough to protect different transaction from abuses and to the user's trust. XML based services have two challenges i.e. security and performance. XML based security threats are emerging and consists of mainly data compromise, XML based DoS (Denial of Service) and Content based attack. The computer hardware can understand only one language. When the code is written in XML, hardware has no clue what it means. Parsers as software convert the code into hardware recognizable form. It is the process of analyzing XML document and generates the internal and structured data representation to be accessed by application program. The main aim of parser is to transform XML into a readable form. Maruyama et al. (2002) poised that parsing is the fundamental function of XML processor. XML processing function includes XML parsing with schema validation. It parses the XML message and checks for its validation. The result of XML parsing should provide enough support for XML query, XML security. It transforms the text into a data structure such as semantic checking, code generation.

As Before computation of digital signature, the canonicalization has to be performed to show the presence of canonicalization element in signed info. An XML signature is verified by using URI information of resources in reference element. These resources are transformed using transform algorithm specified in transform method element. Digest value is accessed using digest algorithm which is specified in digest method element. The computed digest values are compared with Signature value for verification of references. The signature is verified using public key information which is received from the KeyInfo element and this value is compared with value in the signature value element. XML signature neither specifies how keys are associated with persons nor the meaning of data being referenced and signed. The complete process flow is in the paper by Wang Wei (2007).

XML Encryption (2002, 2003) described XML signature and encryption as widely used and building block technologies. It is easy and a natural way to handle security in data interchange application. XML security system consists of XML parsing with schema validation, XML signature and XML encryption. If XML is used at server side then it is consider as a data exchange format. Sending the data from client to server has many advantages such as self-describing data and loosely coupling between the client and server.

4. PARSING TECHNIQUES

Parsers can be in different format and style such as free standing software, libraries, modules and classes. Parsers can be divided into two independent dimensions 1. Validate, 2. Non validate

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parser. A validating parser compares a set of specific rules for specific XML file and gives decision about default values and validates data types. It uses document type definition or XML schema definition. A non-validating parser provides the code for quick check for all basics. It is simpler as compared to validating parser. During development cycle, validating XML parser ensures the documents generated by server are clean. Apart from above parsers computer hardware uses standalone parser which requires separate package to parse XML. These parsers are handy, so that user can parse the code locally or without editor. These parsers serve little purpose as most of the editing software has inbuilt parsers.

XML parser is software or Java class which reads XML file and checks for its conformance to standard and validates it. XML parser generates a structured tree to return the results to browser. It is similar to processor that determines the structure and properties of data. XML parser deciphers the XML code and provides the information to the program for reading the files. XML is not very efficient way to express data, as latency is major issue of data transfer rate and latency rate is very high during transfer of message. Wei Wang (2007) in his paper has defined two key challenges i.e. Security and Performance for deployment of XML based services. The security issues lead to development of XML security processing functions, XML encryption and XML signature to provide element level protection. Increase in XML traffic and increase in consumption of system resources by XML processing overloads the system and decrease the performance of XML based services. The XML devices require advance XML processing algorithm to support high performance services.

Parsing can be done either through algorithm or by programming interface. Researchers have given different algorithm for parsing. Papakonstantinou (2003) has defined Tree parsing algorithm which parses the XML message into a tree name where element name and attribute values are represented as nodes. Hanslo (2003) in his paper said that XML is widely adopted and preferred mark-up language because of its easy integration with other system. He also stated that most of the processing time at the client and server will be spent in parsing XML document and extract the required data. Nag (2004) in his paper defined the tokenized XML format as memory efficient parsing algorithm. This algorithm is optimized by using a code table for memory usage and XML query. The XML message is cut into several pieces and stored in memory.

Zang (2006) in his paper defined non extractive parsing algorithm which is having a two-tuple integer array for each character string in XML message. The first tuple is used for offset of the string and other is used for the length of string. This is very useful in memory usage and XML query, but does not support XML security processing. These three algorithms are well designed but do not aim at specific XML security processing such as XML encryption and XML signature. The strict syntax and parsing requirements make necessary parsing algorithm extremely simple efficient and consistent. The further research detail is on the XML paring with secure feature. XML parsing can also be done through following two Programming interface i.e. 1. DOM (Document Object Model) 2. SAX (Simple API for XML). The new and other developed model use the aforesaid programming interfaces as their base. These models are actually API used by user for processing XML document with Java. XML uses Document Type Definition (DTD) with extension .dtd to provide the specification to text element in a model document. It specifies the attribute and the valid value of element. XML processor includes two basic types of APIs to read XML document **a.** Tree based APIs **b.** Event based APIs. DOM model (2004) in their paper described DOM as a tree based API for accessing XML document. The XML document is represented as tree structure where XML tag is a node. Data is stored as a tree in memory which allows navigating the tree and serializes it back. This is also a drawback as it requires more memory to store the entire document even when only a portion of document is to be processed.

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XML tutorial (2005) described SAX as primary event based processing. This reports the parsing event directly to application through call back method. JDOM (Java based Document Object Model), JAXP (Java API for XML processing), Xerces are few types of API supporting both DOM and SAX. These parsers require more memory and are resource intensive.

Soma Gosh (2003) in her paper showed that due to demand of more processing power by XML parser, J2ME applications are moving out of this trend. MIDP programmers take the advantage of small foot print XML parser to develop program for J2ME application. Collado et al. (2008) has described another problem of dynamic allocation of memory during XML parsing operation. As the process is not time deterministic, so leads to memory fragmentation and failure to allocate sufficient memory for the operation. They have defined a processor named EXDOM (Embedded XML DOM Parser) using J2ME platform for data analysis on Network Embedded System (NES) and optimal use of memory. It works with environment that has limited memory and computational power and also overcome the problem of predictable real time response. It deals with pooling and reuse of objects, node value retrieval with single tree navigation operation and programming optimization with Inlining method. They have used the basis of Cheng (2006) who said that the set of optimization practices like class merging, elimination of variables or method Inlining reduce the size of codes or heap usage; where reduction in code size decreases the total number of bytes used by program in memory and reduction of heap usage indicates the availability of dynamic memory for other application. EXDOM has shown a better performance on execution time for small XML document. It also avoids the garbage collection and maintains a constant amount usage of memory. It lacks in method in order to improve the performance and predictability of XML document serialization. It does not define the method achieve full XML compliance whilst maintaining the performance characteristics.

Wenjun Liu (2010) in his paper defined the web service's architecture and constructional method as a solution to data transmission between mobile clients and WEB server and XML data parsing by taking care of few issues like mobile devices, small memory capacity and high cost of wireless network. He has described a model based on M-Commerce and Web services and use three primary steps i.e. Service Identification, Service Appointment and Service Realization. He has described a model which explains the M-Commerce architecture which is based on web service using J2EE_J2ME technology and SOA method. He has used simple parsing of XML. The only difference is that the client uses a specific method of web service which according to client makes no difference with any other method, but actually clients are communicating with deputy classes. He has used HTTP protocol as request/response protocol as all the realization of MIDP support HTTP, so it becomes suitable for all kind of mobiles.

Rami Alnaqeib et al. (2010) in their paper has shown that the different way to reduce XML parsing is to change XML, which is an idea behind less than 19 proposals for binary representation of XML document, as the binary representation is faster than textual data. In their paper they have given the conformance test on a number of parsers like Elliotte conducted test and concluded that Xerces is most conformant parser to SAX standard. Mohseni in his performance test showed that Microsoft XML (MSXML) had shortest load time. Among the DOM parser no one is proven as best option. Ajeet Singh et al. (2012) in their paper described two important security technologies – XML signature and XML Encryption with review of XML key management of public keys to protect the payment information distributed over internet. They have provided a security mechanism that is not covered by SSL/TLS. In their mechanism they have also assumed that the data is parsed in XML.

In summary, we can say that Xerces is the best option as it provides support to XML and API standard. It has also won the award of best XML parser in year 2002 by XML journal/web services journal reader's choice award. From the above discussion it has been shown that poor

International Journal on Computational Sciences & Applications (IJCSA) Vol.3, No.5, October 2013 performance in parsing XML file causes the serious obstacle to adopt XML based solution in E-Commerce and M-Commerce. Therefore, many researchers are working also till date to improve the parsing phase even by binary representation of XML document. Researchers are also working on schema specific parsing, where parser is generated to only recognize XML document compliant with the source XML schema specification.

5. EFFECT OF OPERATING SYSTEM ON XML PARSING

The mobile operating systems are pre-installed on smart phones and have different criteria in security and functionality than desktop systems. There are different operating systems used in mobile devices. Each operating system is used in specific mobile device and support XML Processing. The parsing of XML file in different operating system takes different time. A few of operating system can parse XML file by the use of third party software. The mobile operating system restricts administrative control through users. The detail of common operating system used in mobile devices is:

1. **Apple iphone operating system:** Apple is major market player and given an edge to his competitors. Dotcom infoway (2009) in his paper poised that apple has given a PC-grade operating system for smart phones. Microsoft Windows for mobile edition has given apple iphone operating system a big competition. Palm operating system works as comprehensive OS for smart phones. Apple iphone has no background thread and has ambiguous approval process whereas android has limitation of limited documents.
2. **Google Android :** It is similar to Apple iphone operating system. The main advantage of this operating system is that it is tied with web based search and other services. Google has opted for Java as programming language and help the programmer to program the application with eclipse and stimulate the application in another Java process. The Java based application tools are of low cost and takes less time to develop. The SAX and DOM XML parser are available for android. Both parsers API is on android are as same as Java. These parsers have their limitations so these are not recommended to use.
3. **Symbian Operating system:** This operating system works with lower end phones with less memory and not having a pure web browsing and GPS utilities but having J2ME application. It has captured the market because of easily affordable cost.
4. **RIM Black Berry:** This uses a unique push technology. It runs dynamic widgets in background and at the same time give active alert to user. It provides emulator but it has limitation that it can only use J2ME and few RIM libraries.

J2ME has different standard libraries to process XML Files different parsers are available for different operating system. The Java standard also has STAX parser which is also not a part of android platform. Android provide XML parsing which is not available in standard Java but has similarity with STAX parser. The pull parser is the best option to use on android platform because it is fast and require less memory as compared to DOMAPI.

6. XML PARSING

The mobile devices use internet connection to make transaction. The most efficient way to transfer data between different platform and technologies is to use XML file. XML parser is required to process and extract XML file. A node is required to process XML file. It can be done through following coding:

```
{  
this.nodetype=nodetype;  
this.children=new vector();  
this.attribute=new Hashtable();  
}
```

This node is parent text node which is used to get data by using getAttributeNames() function. The data received is put into file by using attribute.put(). The child node can be generated using aforesaid coding which is required to enter the data. The string data type is used to get the data. Once the data is entered, the next step is to parse the XML file. A generic parser class is defined using Kxml parser.

```
Public class GenericXMLParser  
{  
public XMLNode parseXML(KXmlParser parser, Boolean ignore whitespaces) throws Exception  
{  
Parse.next();  
return _parse(parser,ignoreWhitespaces);  
}
```

This code help to parse any XML file. The code is tested successfully in lab of Telecommunication Company to see the result which shows that code can parse the file. This code uses kXML parser which is a pull parser to avoid fragility caused by SAX parser. The code takes very less time to execute and allow the safe transmission. The hacker has very less to make any changes in transaction. Parsing makes the small packets of file to fasten the processing of the file. This code of parsing has different effect on different operating system. As explained earlier operating systems effect the transmission of data through mobile devices. This code is very helpful in working with android operating system as DOM and SAX parsers both can work easily on android operating system.

7. CONCLUSION

XML file is use to transfer the data through mobile device because of features. The parsing of XML file reduces the size of file. The parsing can be done through algorithm and programming interface. The proposed coding of parsing reduces the size of XML file to transact the data fast and increase the security of transaction. The different operating systems used in mobile phones have different impact on parsing the files. They affect the performance of parser. The further research can be made on parsing techniques with respect to operating systems of mobile device.

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As the new technology is developing the devices are coming with new and advance operating systems, so this study is not limited.

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