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A New Approach for Web Content's Universal Access

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A New Approach for Web Content's Universal Access

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Abstract:- WAP (Wireless Application Protocol) is not a service but a technology for developing various wireless applications. WAP is a complete open technology for delivering Web content to mobile devices such as: cellular mobile phones, PDAs (Personal Digital Assistants) and pagers independent of carrier, vendor, or network technology. Users need to maintain Web contents (data) and access Web/WAP browsers and other Web services by transform the XML files to the required output. Web pages are being delivered one at a time from a Web server whereas WAP delivers a deck of related cards, each card representing a screen of information, at a time. The client side script language being used in WAP model is WMLScript whereas Web uses JavaScript.

The classical approach is required maintaining multiple sets of Web pages for different Web Browsers and maintains other pages for WAP Browsers. This operation needs more time and efforts. In this paper, we presented a new algorithm to approach the problems of maintaining the Web contents (data), and the universal clients access (deliver the same data in different formats, to different Web/WAP browsers, and to other Web Servers) by transform the XML files (Web contents files) to the required output (designated Markup Language) based on the XSL Stylesheet.

The proposed algorithm called "X2HW Transformation". It is a general approach for transformation by using ASP to program the MSXML component for transforming a XML file to both HTML and WML files based on the XSL Stylesheet.

Key-Words: - Web Content Management, Universal Clients Access, Files Transformation, WAP, Web, XML, HTML, WML, XSL.

1. Introduction

There are millions of users all over the world began using a different devices to access the Web contents. However, after advent of the WAP (Wireless Application Protocol) there are two main types of thin client devices that request the Web contents:

1. Personal Computer: in this case the end-user requests the Web contents by using Web Browser like MS Internet Explorer, Netscape Navigator, and others.
2. Handheld Digital Wireless Device: like Cellular Mobile Phones, PDAs (Personal Digital Assistants), and Pagers. In this case the end-user requests the Web contents by using WAP Browser (micro-browser).

According to these types of thin client devices the Web developers must be:

1. Maintain multiple sets of Web pages for different Web Browsers.
2. Maintain a new set of pages for WAP Browsers.

The classical way for Website developers to approach the problems is to maintain two main sets of pages which are the HTML for the Web-users and WML for the WAP-users. However, this will increase redundancy, and means maintaining multiple user interfaces for essentially the same content. Universal access relates to the fundamental relation between use and technology [1]. These required minimal development effort to access the Web contents via several form of client devices.

In this paper, we presented another new approach to solve the Web content management and universal access problems by using XML and XSL Stylesheet technologies.

2. General Concepts

There are many general Web concepts need to be considered as the following:

2.1. XML: XML stands for Extensible Markup Language. XML is a meta-markup language [2]. So it is not a replacement for HTML. XML is a set of rules for creating semantic tags used to describe data (XML used to describe and carry the data). While HTML is used to specify the layout of a web page (HTML used to display the data).

The best description of XML is as a cross-platform, software and hardware independent tool for storing and transmitting information [4]. XML files use a self-describing and simple syntax.

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<note>
<to>Alaa</to>
<from>Mazin</from>
<heading>Reminder</heading>
<body>Don't forget me this Paper!</body>
</note>
```

The first line in the XML file - the XML declaration - defines the XML version and the character encoding used in the file. In this case the file conforms to the 1.0 specification of XML and uses the ISO-8859-1 (Latin-1/West European) character set. The next lines describe the root element of the document and describe 4 child elements of the root (to, from, heading, and body).

2.2. XSL: XSL stands for Extensible Stylesheet Language. It is a Stylesheet language to match XML. The World Wide Web Consortium (W3C) started to develop XSL because there was a need for XML based Stylesheet Language [3].

XSL is an XML-based language (application of XML) that can be used to manipulate, sort, and filter XML data. The original XSL language has been further split into three parts to use Extensible Stylesheet Language for:

- Transformation (XSLT).
- Rendition (XSLR).
- Finding Path Expressions (XPath).

XSL file use root element that declares the XSL Stylesheet file. The XSL root element is `<xsl:stylesheet>`.

The correct way to declare an XSL Stylesheet according to the W3C XSLT Recommendation is:

```
<xsl:stylesheet version="1.0" xmlns:xsl=
"http://www.w3.org/1999/XSL/Transform">
Where the xmlns:xsl="http://www.w3.org/1999/
XSL/Transform" identifies the official W3C XSL
recommendation namespace. When use this
namespace, so must also include the attribute
version="1.0" [4].
```

2.3. XSLT: XSLT stands for Extensible Stylesheet Language Transformation. XSLT is the most important part of the XSL Standards. It is a language for transforming XML file into another file format that is recognizable to a browser, one such format is HTML. XSLT enables Web developers to define templates for Web output, into which XML data can be transformed. XSLT became a W3C Recommendation at 1999 [4].

However, table (1) lists the main XSLT elements that used in XML file transformation. All of these elements have the following syntax: `<xsl:element>`

2.4. MSXML: MSXML stands for the Microsoft XML Parser Technology [5]. An MSXML parser component already builds-in Microsoft Internet Explorer 5. MSXML is parsing the XML file to view on Web Browser. However, Microsoft released an updated version of the XML parser (MSXML 3), which can be downloaded from <http://msdn.microsoft.com/downloads/webtechnology/xml/msxml.asp>.

2.5. DOM Object: DOM stands for Document Object Model. It is a one of MSXML objects. DOM is a standard programming interface for wide variety of applications. The XML DOM is designed to be used with any programming language and any operating system.

The MSXML DOM object represents the top level of the XML file. DOM has methods and properties allowing us to create all other XML objects. With DOM can be create an XML file, navigate its structure, and add, modify, or delete its elements [6].

Table (1): Some of XSLT Elements.

XSLT Element	Description
attribute	Adds an attribute.
attribute-set	Defines a named set of attributes.
call-template	Calls a named template.
copy	Creates a copy of the current node.
element	Creates an element node in the output document.
for-each	Loops through each node in a specified node set.
if	Contains a template that will be applied only if a specified condition is true.
include	Includes the contents of one style sheet into another.
message	Writes a message to the output.
namespace-alias	Replaces a namespace in the style sheet to a different namespace in the output.
output	Defines the format of the output document.
param	Declares a local or global parameter.
processing-instruction	Writes a processing instruction to the output.
sort	Sorts the output.
text	Writes literal text to the output.
transform	Defines the root element of a style sheet.
value-of	Extracts the value of a selected node.
variable	Declares a local or global variable.
with-param	Defines the value of a parameter to be passed into a template.

2.6. ASP: ASP stands for Active Server Page. ASP is a HTML page, which include scripting and create interactive Web Server application. The ASP script code runs on the Web Server rather than on the Web Client (Web Browser) to generate interactive Web applications. ASPs developed by Microsoft, so it works with only Microsoft's Web Servers. An application on the Web may be a group of ASP files. The ASP files work together to perform some purpose [7].

3. The Proposed Approach

As a general requirement for Web Content Management Systems (WCMS), the content will be separate from presentation [8, 9]. However, in this section, the description will be given for how to generate content for display on both Web browsers and WAP browsers, by using two different algorithms. In a real application, the XML file can be generated from a database or otherwise dynamically created. So, the Web content (data) will be stored and managed by database, and will retrieved as XML file. While using XSL Stylesheet provides a clear separation of content and display (presentation information).

Figure (1) shows the general overview of XML file for motion into a HTML or WML files using XSL Stylesheet.

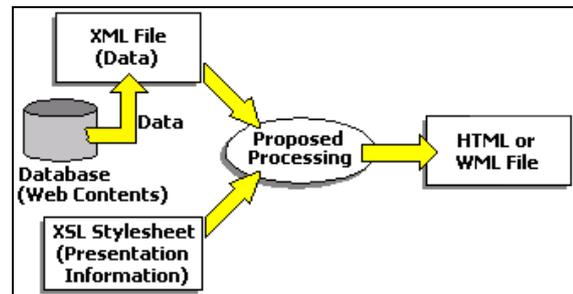


Fig. 1: An Overview of General Transformation Process.

In the proposed approaches:

- The data is stored in databases and retrieved as XML file.
- The presentation information is kept inside an XSL Stylesheet.
- The proposed processing will transform the XML file to the required output based on the XSL Stylesheet.

The proposed algorithm achieves the transformation activity from XML files into a designated markup language and it is called X2HW Transformation Algorithm (*X2HW Transformation stands for XML to HTML and WML Transformation*).

The X2HW Transformation algorithm described how to use XSLT to transform XML file into HTML and WML file to display the output file on Web Browser or on WAP Browser. Figure (2) shows an overview of the X2HW Transformation process.

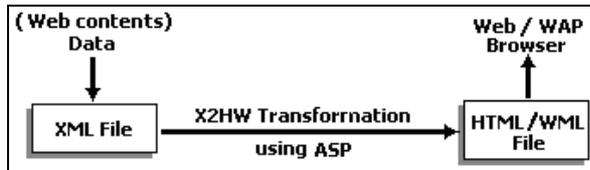


Fig. 2: An Overview of the X2HW Transformation Process.

To achieve the transformation of XML file into the desired target platform dynamically, during runtime, the ASP abilities will be used.

There is some important software required to achieve the X2HW transformation works. These are:

1. Web Server like IIS (Internet Information Services) for Windows XP or PWS (Personal Web Server) for Windows 95/98/NT. To save and run ASP codes which is used to manipulate the XML file at the Server side.
2. Thin Clients (like Handheld Digital Wireless Devices) that need any savings in processing we can give them. Also it means that not need to have XSLT support in the Client.

3. MSXML component. It is already build-in MS Internet Explorer 5.
4. XMLDOM Object. To obtain or create all other XML objects needed.

In the X2HW Transformation algorithm, there are two XSL Stylesheets:

- The first Stylesheet for generating HTML code.
- The second Stylesheet for generating WML code.

Figure (3) shows the X2HW Transformation outline process.

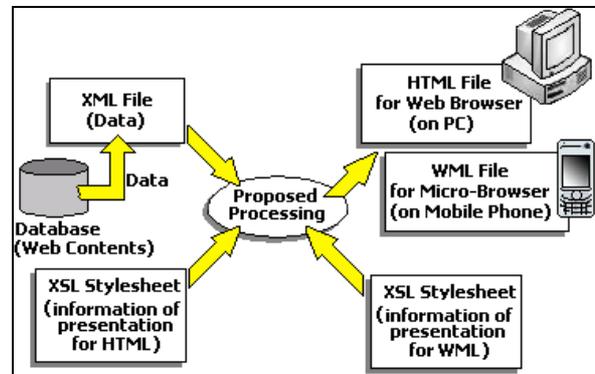


Fig. 3: The X2HW Transformation Outline Process.

The following X2HW Transformation algorithm steps:

X2HW Transformation Algorithm:	
The Input:	XML File. XSL Stylesheet File.
The Output:	HTML or WML File.
The Processing Steps:	<p>Step 1: Create an MSXML DOM object (in this case MSXML1.DOMDocument), to load XML file.</p> <p>Step 2: Set the async property to false, so that the XML file is fully loaded before control is transferred back to the script.</p> <p>Step 3: Create another MSXML DOM object (in this case MSXML2.DOMDocument), to load the XSL Stylesheet file.</p> <p>Step 4: Check the Client type, according to word Mozilla.</p> <p>Step 5: If it contains the word Mozilla, it must be a web browser, Goto step 7.</p> <p>Step 6: If not, the user is using a WAP device. Goto step 11.</p>

- Step 7:** Open XSL Stylesheet for HTML.
- Step 8:** Specify the beginning of the HTML file in the XSL Stylesheet.
- Step 9:** Insert the beginning of the HTML file into the output file.
- Step10:** Goto step 14.
- Step11:** Open XSL Stylesheet for WML.
- Step12:** Set the appropriate WAP type.
- Step13:** Open XML file.
- Step14:** Repeat until end of XML file:
- 1:** Extract the data enclosed by the XML elements in XML file.
 - 2:** Extract the value of the attribute defined in XML file.
 - 3:** Insert data in the Output file.
- Until the XML file is finished.
- Step15:** Close tags for the XSLT tags.
- Step16:** Close XML file.
- Step17:** Close XSL Stylesheet file.
- Step18:** Finish.

Note:

The “Client type checking” Step (Step 4, in the X2HW transformation algorithm), checks the HTTP_USER_AGENT variable, by using ASP ServerVariables method. If HTTP_USER_AGENT variable contains the word “Mozilla”, it must be the end-user is using Web Browser based on PC. Otherwise the end-user is using a WAP Browser based on WAP device (like mobile phone).

So, if the end-user agent is a Web Browser, the XSL Stylesheet for HTML is loaded. Otherwise we load the XSL Stylesheet for WML.

4. Conclusions

The Web content maintains a universal client access to these contents which required minimal development effort. The classical approach is worst, because it required maintaining multiple sets of Web pages for different Web Browsers and maintains other pages for WAP Browsers.

In this paper, the proposed approach (X2HW transformation algorithm) is needed less time and effort and it is more efficient than classical approach. By using a dynamic transformation-during run time code on the Web server side the content maintained and universal access became easier.

The proposed approach (X2HW transformation algorithm) has the following attributes:

- a. Special input-files transformation algorithm: The input file to the proposed X2HW transformation algorithm is XML files (Web content files), and the output files from it are HTML or WML files.
- b. General output-files viewable: The output files from proposed X2HW transformation algorithm viewable on Web or WAP Browser.
- c. Integrated Code: X2HW transformation approach used ASP code as a transformation function. So the transformation function can be integrated through ASP code with other Web or/and WAP applications.

As a future work, it is possible to develop a hybrid approach using XML (to describe and carry the data) and XSL Stylesheet (to describe and carry presentation information) that both managed by a databases.

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