Plastic ML and its toolkit

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Abstract

This paper presents Plastic ML, a language based on XML, which can be used to describe user interfaces for Internet. With Plastic ML toolkit, programmers create graphically some XML documents, on a high level interface. Thanks to XSL translations, automatically made, it provided targeted files, such as HTML, WML and VoiceXML.

1   Introduction

The rise and great success of Internet is mainly based on the technical standards used: Hypertext Markup Language (HTML), Wireless Markup Language (WML) [WAP], VoiceXML (Voice eXtensible Markup Language) [VoiceXML], etc. For the Web, HTML combines data and presentation into one document. Oppositely, XML (eXtensible Markup Language) provides separation between data and its presentation format [XML]. Considering the human-computer interaction domain, some authors indicate that the wide platform variability *encourages a return to the study of some techniques for device-independent user interface specification* [Myers, Hudson & Pausch, 2000].

Recent years have seen the introduction of many types of computers and devices. The availability of such a wide range of devices has become a challenge for designers of interactive software systems. Today, to reach N information through M peripheral is equal, for the developer, to write N * M programs. However, from the user point of view, the service offered should remain the same. Instead of coding N * M applications, researchers try to offer one model for many interfaces [Paternò, Mori & Santoro, 2003]. This is called plasticity: it's the ability of a user interface to be re used on multiple platforms that have different capabilities [Calvary, Coutaz, & Thevenin, 2001]. The researchers of the Cameleon Project, for example, work on the plasticity of the users interfaces [Cameleon Project]. The personalization may depend on many factors such as the client device, the user profile (roles, access rights, skills, abilities, handicaps, etc.), the location, the access history... The goal of XIMA (eXstensible Information Management Architecture), for example, was to *develop a universal client framework that requires minimal development effort to access an application via another form of client device* [Signer, Norrie, Geissbuehler, & Heiniger, 2002].

New languages like UIML (User Interface Markup Language) [UIML], XIML (eXtensible Interface Markup Language) [XIML] are used to describe and generate such kind of interfaces. UIML is an XML language developed for defining user interfaces and XIML, a common representation for interaction data, is able to *represent the abstract aspect of a user interface, such as the context in which interaction takes place, and the concrete aspects, such as the specific widgets that are to be displayed on a screen* [Puerta & Eisenstein 2002]. XFORMS [XFORMS] is announced as an XML application that represents the next generation of forms for the Web. By

splitting traditional forms into three parts (XForms model, instance data, and user interface) it separates presentation from content, allows reuse, gives strong typing, as well as offering device independence and a reduced need for scripting.

Even if all thus kind of markup languages try to describe interfaces on a high level, according to us, they are still close to the graphical interaction mode, and not enough on an abstract level to really proposed satisfying automatic interfaces generation. In the XWeb project, the researchers had the same concern : *Our final challenge is to deal with both audio-based and visually oriented interaction in the same architecture. This is somewhat complicated by the lack of speech widget, in earlier work* [Olsen, Jefferies, Nielsen, Moyes, & Fredrickson 2000]. Moreover, there are not proposed with sufficient tools to conceive, design and experiment user interfaces. In this paper, we present Plastic ML, an XML-based language currently being developed in our laboratory, and its toolkit.

2 Needs

Appliance-independent ML provides natural separation of user interface from non-interface code; it is usable by non-programmers and occasional users, it facilitates rapid prototyping of user interfaces [Abrams, Phanouriou, Batongbacal, Williams, & Shuster, 1999]. Indeed, people need authoring tools to graphically compose and edit ML user interfaces, eliminating the need to manually write the appropriate code. Our goal is to propose a tool that will allow the creation of Plastic ML. It must be able to create, load, modify and save generic elements of this language, but also, it could be used to transform a plastic ML into another ML (such as HTML, WML, VoiceXML), thanks to XSL documents [XSL].

3 Plastic ML

This ML is currently composed of simple elements such as PAGE, FORM, FIELD, and OUTPUT. Figure 1 gives an example of a Plastic ML document.

```
<?xml version="1.0" encoding="UTF-8" ?>
- <page>
  - <form Action='http://trg70.univ-lille1.fr/verification.php' Method='POST' Name='welcome'>
      <field Type='text' Description='Your name' Length='20' Max='30' Name='ask_name' Voice_Grammar='Names.gkz' />
      <field Type='text' Description='Your age' Length='3' Max='3' Name='ask_age' Voice_Grammar='0_99.gkz' />
      <field Type='secret' Description='Your password' Length='6' Max='6' Name='ask_pw' />
    - <field Type='choice' Description='Your favorite color' Name='favorite_color' Voice_Grammar='Les_chiffres.gkz'>
        <Value internal='G'>Green</Value>
        <Value internal='B' default='yes'>Blue</Value>
        <Value internal='R'>Red</Value>
        <Value internal='Y'>Yellow</Value>
      </field>
      <field Type='reset' Name='To_Cancel' Value='Cancel' />
      <field Type='submit' Name='To_Submit' Value='Validate' />
    </form>
</page>
```

Figure 1 : Example of Plastic ML file

In this document, the secret attribute of the field element is used to describe entering information that is considered sensitive, and thus not echoed to visual or aural display as it is being entered (password in particular).

4 Plastic ML Toolkit

Such as FrontPage or Dreamweaver for HTML, and Voxeo Designer [Voxeo] for VoiceXML, Plastic ML toolkit is an editor, specially dedicated to the creation of documents written in this language. Figure 2 presents a snapshot of the tool, where the user can create, edit, modify, delete, load and save Plastic ML files, thanks to graphic interactions. By clicking on the visualization button, he/she obtains the results of XSL treatments.
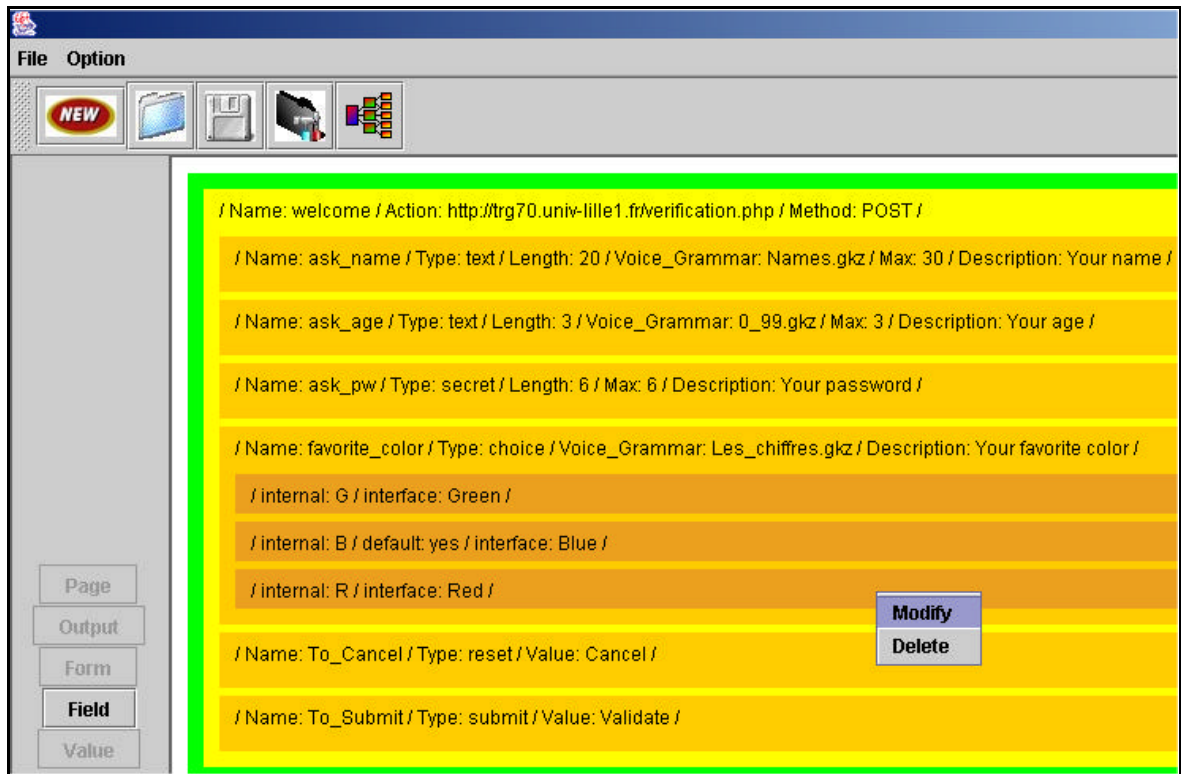
Figure 2 : Plastic ML toolkit

5 Results

The Plastic ML document shown in Figure 2 is automatically translated into its equivalence in HTML, and the resulting interface is presented in Figure 3. We can see that the description attribute of the field tag (plastic ML element) is used as a label for this textual presentation. On an aural mode, with voiceXML for example, it will be pronounced to the user (speech synthesis), and the voice grammar associated will be used to listen to the user's answer (speech recognition).

Figure 3 : Web appearance

Figure 4 represents the WAP interface obtained for this device. The secret item, for example, has been translated in a password attribute in the input tag.

Figure 4 : Wap appearance

On the Figure 5, we can see the VoiceXML code produced when the chosen device is a phone. Particular tags of the Plastic ML are used to select the appropriate voice grammar. When an input is specified as secret, the system asks the user to enter the data with the phone keypad (DTMF input). The default element of the field "favorite_color" is enounced first.

```xml
<?xml version="1.0" encoding="UTF-8" ?>
- <vxml version="1.0">
  - <form id="welcome">
    - <field Name="ask_name">
        <prompt>Your name</prompt>
        <grammar src="Names.gkz" />
      </field>
    - <field Name="ask_age">
        <prompt>Your age</prompt>
        <grammar src="0_99.gkz" />
      </field>
    - <field Name="ask_pw">
        <prompt>Use your phone keypad to enter Your password</prompt>
      </field>
    - <field Name="favorite_color">
        <prompt>Your favorite color :</prompt>
        <prompt>Blue ?</prompt>
        <prompt>Green ?</prompt>
        <prompt>Red ?</prompt>
        <grammar src="Les_chiffres.gkz" />
      </field>
    - <block>
        <submit next="http://trg70.univ-lille1.fr/verification.php" namelist="ask_name ask_age ask_pw favorite_color" />
      </block>
    </form>
  </vxml>
```

Figure 5 : VoiceXML code obtained

6   Conclusion

We have presented Plastic ML and its toolkit. In a graphical environment, programmers can create Plastic ML documents, by clicking on buttons and choosing elements of their generic interfaces.

But of course, it is possible to write plastic ML documents with classic text editors. The toolkit is able to load a Plastic ML file and gives the corresponding graphical representation. Then, according to different XSL documents, it is easy to translate the source into several targets. In our prototypal architecture, written in PHP, we can obtain HTML, WML and VoiceXML. We have to work on the proposition of other tags. For example, is it interesting to propose a generic element for entering multiline content, equivalent to the TextAera tag known in HTML? Is it relevant to implement plastic markup for upload elements, output tags such as media, range, alert or error control element? If it is simple to render this kind of element in HTML, how could it be transposed in an oral mode, or with small devices?

7 References

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[WAP] http://www.wapforum.org

[XFORMS] http://www.w3.org/TR/xforms

[XIML] http://www.ximl.org

[XML] http://www.w3.org/XML

[XSL] http://www.w3.org/Style/XSL

8 Acknowledgements