A Configurable XForms Implementation

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Outline of the talk

• Introduction
• XForms language
• Requirements for the XForms processor
• Design of the XForms processor
• Integration to UI toolkits
• Integration to host languages
• Configurations
• Conclusion
Introduction

- HTML is still the main format in delivering applications in the Web
- HTML has been stretched to its limits
  - Scripting or page refreshing is used as a “hack” to create more desktop-like UIs
- New requirements
  - Device independence
  - Accessibility
  - Application re-use
Related work

- Form languages
  - XFDL, XFA
  - Microsoft Infopath
  - HTML forms
- Declarative UI markup languages
  - UIML
  - Netscape/Mozilla XUL
  - Microsoft XAML
- Client-side XForms implementations
  - Formsplayer (IE plugin)
  - Mozilla implementation coming up...
XForms

- W3C’s next-generation Web forms language
- Based on existing powerful XML technologies
- Allows creation of advanced online user interfaces
- X-Smiles group participates in specification work
XForms language

- Instance – content
- Model – validation, constraints, calculations
- User interface – the form controls
- Model-View-Controller model
- Additionally
  - Binding – between instance, model and UI
  - Submission – send and receive the instance to/from the server
XForms deployment

Client (XForms processor)

Form

Model

Instance

User Interface

Server

Model definitions

Application logic

XML Instances

UI definitions

HTTP
Gene query system

Query
Query string: SWI

Matched genes
YDR146c/SWI5
YER111c/SWI4
YKL176c/SWI3
YLR182W/SWI6
YPL016W/SWI1

Selected genes

Delete

Run analysis on selected

Select for comparison

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Requirements for the XForms processor

- Support for XForms 1.0

- External requirements
  - Host languages
  - UI Toolkits: AWT, Swing and HAvi
  - XML Processing, general purpose tools
  - Java virtual machines: J2SE, JDK 1.1, J2ME
Requirements (cont.)

- **XForms Processor**
  - **XForms Full**: XForms 1.0 Support
  - **XForms Basic**: XForms Basic profile support

- **Java VM Support**
  - **Desktop**: Java 2 Standard Edition (J2SE) support.
  - **Mobile**: Runs in Personal Java 1.1 and Java 2 Micro Edition (J2ME) Personal Profile.
  - **Digital TV**: Multimedia Home Platform (MHP)

- **XML Processing**
  - Should allow third party XML parser, XPath, and XML Schema libraries.
Requirement (cont.)

• **UI Toolkits**
  - **Desktop**: Supports Swing Toolkit in Desktop.
  - **Mobile**: Supports Abstract Windowing Toolkit (AWT).
  - **Digi-TV**: Uses Havi Toolkit in digital tv set-top boxes.

• **Host Languages**:
  - **CSS**: Supports CSS flow and box model.
  - **Absolute**: such as in SVG and SMIL.
The XForms implementation

- Part of the X-Smiles XML browser

- As independent module as possible

- Integration to other languages supported by the browser
Design of the XForms processor

- Meta UI, User interface, and Model
XML Processing

- Requirement was to support off-the self XML tools
- XML Parsing
  - Xerces Java parser was used through JAXP API
- XPath Processing
  - 2 processors integrated: Xalan, Jaxen
  - Extended with XForms extension functions and a referent tracking system
- Schema processing: Xerces PSVI processor used
Calculation engine

- Responsibility
  - Keep track of Model Item Properties (MIPs), expressed in XPath
  - Evaluation order
  - Evaluation
User interface

- In XForms, the UI is bound to the instance data with XPath statements
- It is possible to use “dynamic bindings”
  - `<input ref="/user[@id=/selection]/name"/>`
- This means that the implementation has to keep 2 lists
  - Bound item
  - All referenced items
Integration to UI toolkits

- ComponentFactory hides the details of different toolkits
Integration to CSS layout

- The markup does not completely match the layout: how to style the widget?
  - Solution: pseudo-elements

```html
<input>
  <label>Your name</label>
</input>
```

Your name

```html
<input>
  <label>Your name</label>
  ::value
</input>
```

John Doe
Integration to absolute layout

• Absolute layout is used in some markup languages
  – SVG, SMIL

• We studied the integration of XForms with these languages

• Some features of XForms, such as repeat, require a flow-based layout, and it was not possible to integrate them
Platforms

- Written in Java
- J2SE for desktop
- Java1.1 or J2ME Personal Profile for handhelds
- Multimedia Home Platform (MHP) for Digital Television
X-Smiles J2ME Personal Profile

X-Smiles

back forward home reload http://www.xsmiles.org/demo/demos.x

Version 0.9 demos
Textsuite (list of examples)
Homepage: www.x-smiles.org (HTML->XHTML)

Ready. (4.166 secs)
### Storage size of the processor

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<tr>
<th>Component</th>
<th>Basic (KB)</th>
<th>Full (KB)</th>
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<tbody>
<tr>
<td><strong>Browser core</strong></td>
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<td></td>
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<tr>
<td><strong>Browser core + GUI</strong></td>
<td>Basic: 258</td>
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<td><strong>CSS Layout and Renderer</strong></td>
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<td><strong>CSS Parser (Steady State)</strong></td>
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<tr>
<td><strong>XML Parser (Xerces DTD)</strong></td>
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<td><strong>XML APIs (W3C / Xerces)</strong></td>
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<td><strong>1052 KB</strong></td>
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<tr>
<td><strong>XForms processor</strong></td>
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Conclusions

- XForms is a next generation UI markup language for the Web
  - Provides ease of authoring, reuse, device independence, and accessibility.
- We have presented a configurable XForms client
  - Portable to numerous environments supporting Java
- Component Factory (a virtual toolkit) was needed to hide the details of the underlying toolkits
- Integration to host language depends on the layout model
  - In absolute layout, some functionality cannot be used
- In some environments, it is needed to use XForms basic profile, which removes XML Schma processing support
Thank you!