

XFormsDB

An XForms-Based Framework for Simplifying
Web Application Development

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Presentation Outline

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- **Part IV** **The XFormsDB Framework**
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Part I

Introduction

Introduction

- Developing even simple multi-user Web applications is a **complex task**
- The author has to **master many** programming languages and paradigms
 - **Client side:** (X)HTML+CSS+JavaScript
 - **Server side:** PHP/J2EE/Ruby on Rails
 - **Database:** SQL/Object-Relational Mapping (ORM)
- The bulk of Web content authors are **non-programmers**

The Main Research Question

Is it possible to **extend** the **XForms** markup language in such a way that users can build useful, highly interactive multi-user Web applications quickly and easily using purely **declarative languages**?

Part II

Background

XForms

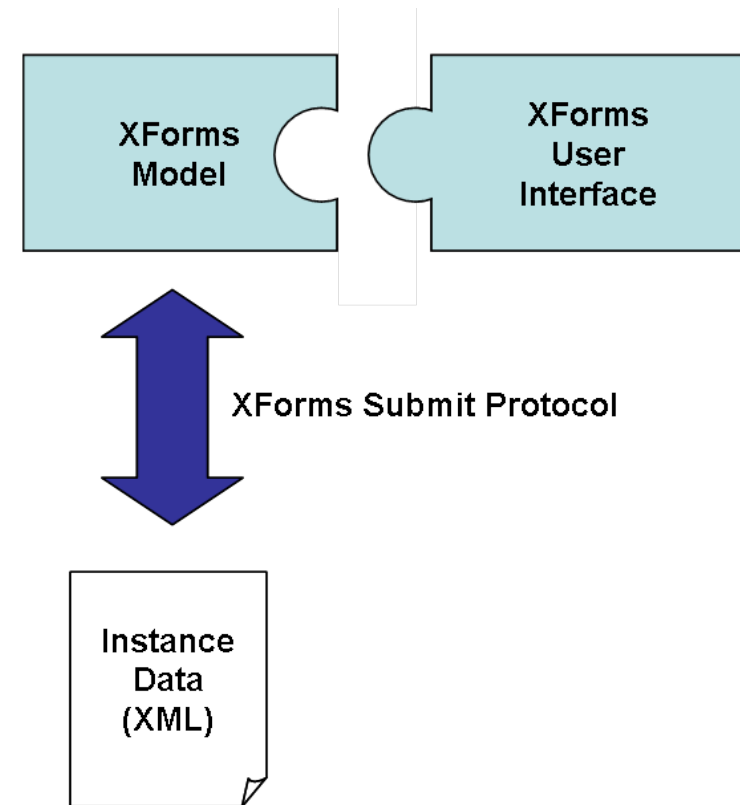
- An **XML**-based forms technology and the successor to **HTML** forms

- A high-level **declarative language** for defining rich Web user interfaces
- Client-side technology
- **Turing complete**

- **W3C Recommendation** since 2003

- **Architecture**

- Based on **Model-View-Controller (MVC)**
- Instance Data (**XML**)
- XForms Model
- XForms User Interface
- XForms Submit Protocol



Example: An XHTML+XForms Document

```
<?xml version="1.0" encoding="UTF-8"?>
<html xmlns="http://www.w3.org/1999/xhtml" xmlns:ev="http://www.w3.org/2001/xml-events" xmlns:xforms="http://
  www.w3.org/2002/xforms">
  <head>
    <title>Mailing List</title>
    <xforms:model>
      <xforms:instance id="form-instance">
        <form xmlns=""><email /></form>
      </xforms:instance>
      <xforms:bind nodeset="instance( 'form-instance' )/email" type="xforms:email" required="true()" />
      <xforms:submission id="form-submission" ref="instance( 'form-instance' )" resource="/form-handler"
        method="post" replace="none">
        <xforms:load resource="thankyou.xhtml" ev:event="xforms-submit-done" />
        <xforms:load resource="error.xhtml" ev:event="xforms-submit-error" />
      </xforms:submission>
    </xforms:model>
  </head>
  <body>
    <h1>Mailing List</h1>
    <p>
      <xforms:input ref="instance( 'form-instance' )/email"><xforms:label>Email:</xforms:label></xforms:input>
      <xforms:submit submission="form-submission"><xforms:label>Subscribe</xforms:label></xforms:submit>
    </p>
  </body>
</html>
```


Part III

The XFormsDB Markup Language

Overview

- **An extension to the XForms markup language**
 - A pure superset of **XForms 1.1**
- **Naturally extends XForms with common server-side and database related functionalities**
 - Can be thought of as **"XForms Server Pages"**
 - Functionalities include, among others: querying and updating (**with** or **without** data synchronization) data stored in data sources, error handling, state maintenance as well as authentication and access control
 - **Easily extensible**, i.e., new server-side functionalities can be easily added to the language

Example: An XHTML+XFormsDB Document

```
<?xml version="1.0" encoding="UTF-8"?>
<html xmlns="http://www.w3.org/1999/xhtml" xmlns:ev="http://www.w3.org/2001/xml-events" xmlns:xforms="http://
www.w3.org/2002/xforms" xmlns:xformsdb="http://www.tml.tkk.fi/2007/xformsdb">
<head>
  <title>Mailing List</title>
  <xforms:model>
    <xforms:instance id="form-instance">
      <form xmlns=""><email /></form>
    </xforms:instance>
    <xforms:bind nodeset="instance( 'form-instance' )/email" type="xforms:email" required="true()" />
    <xforms:bind nodeset="instance( 'form-request-instance' )/xformsdb:var[ @name = 'email' ]"
      calculate="instance( 'form-instance' )/email" />
    <xformsdb:instance id="form-request-instance">
      <xformsdb:query datasrc="mailing-list-data-source" doc="mailing_list.xml">
        <xformsdb:expression resource="xq/form_handler.xq" />
        <xformsdb:var name="email" />
      </xformsdb:query>
    </xformsdb:instance>
    <xformsdb:submission id="form-submission" requestinstance="form-request-instance"
      expressiontype="all" replace="none">
      <xforms:load resource="thankyou.xhtml" ev:event="xforms-submit-done" />
      <xforms:load resource="error.xhtml" ev:event="xformsdb-request-error" />
    </xformsdb:submission>
  </xforms:model>
</head>
```

...

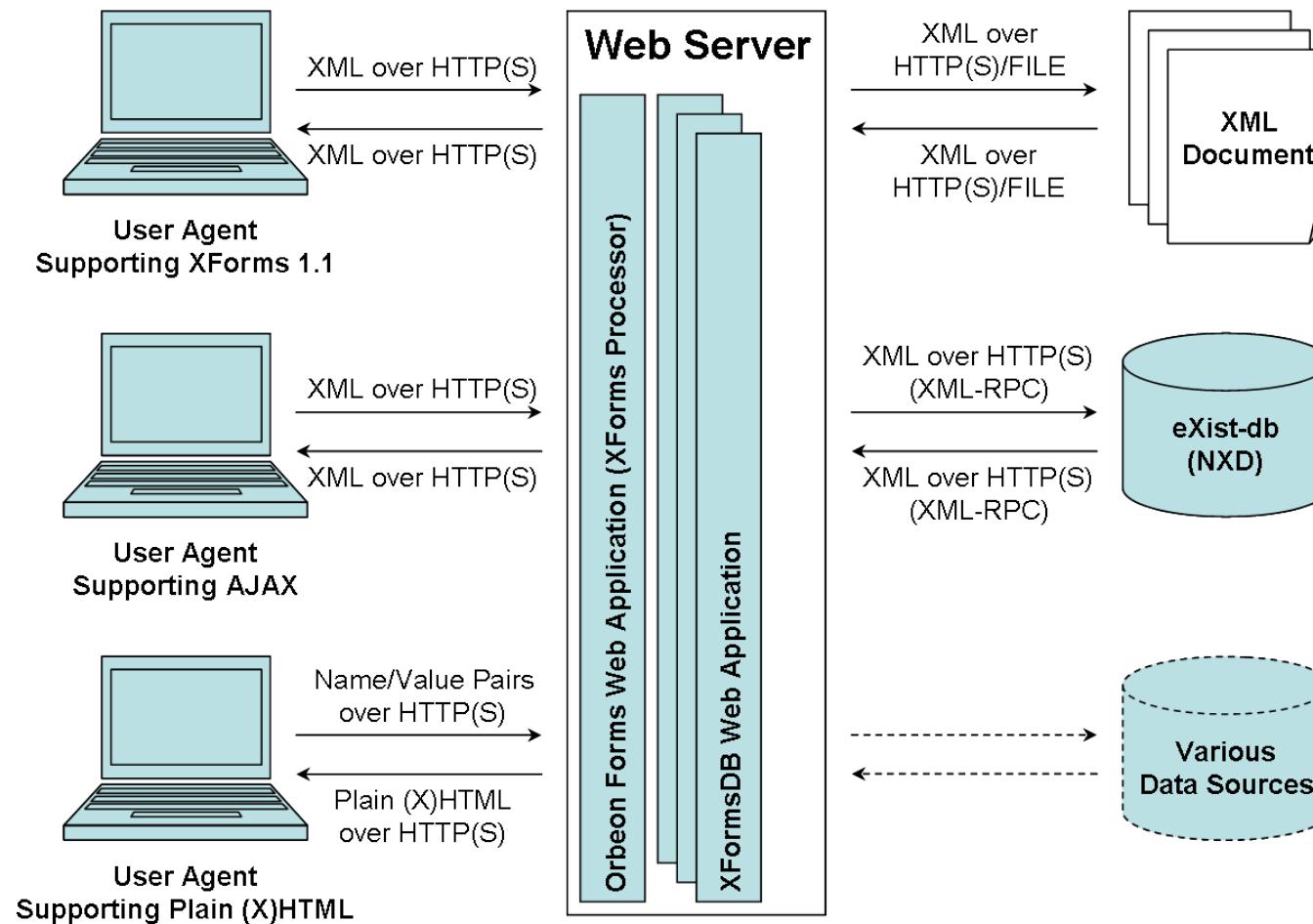
Part IV

The XFormsDB Framework

Overview

- Implements the **XFormsDB** markup language
- A **Java**-based, generic server-side component
 - Provides the integration services to heterogeneous data sources as well as common server-side functionalities
- **Bundled with**
 - An XForms processor (**Orbeon Forms**)
 - A native XML database (**eXist-db**)
- An extremely powerful **XForms/REST/XQuery (XRX)** framework
 - Allows for the rapid development of entire Web applications using a **single** document and under a **single** programming paradigm

High-Level Architecture

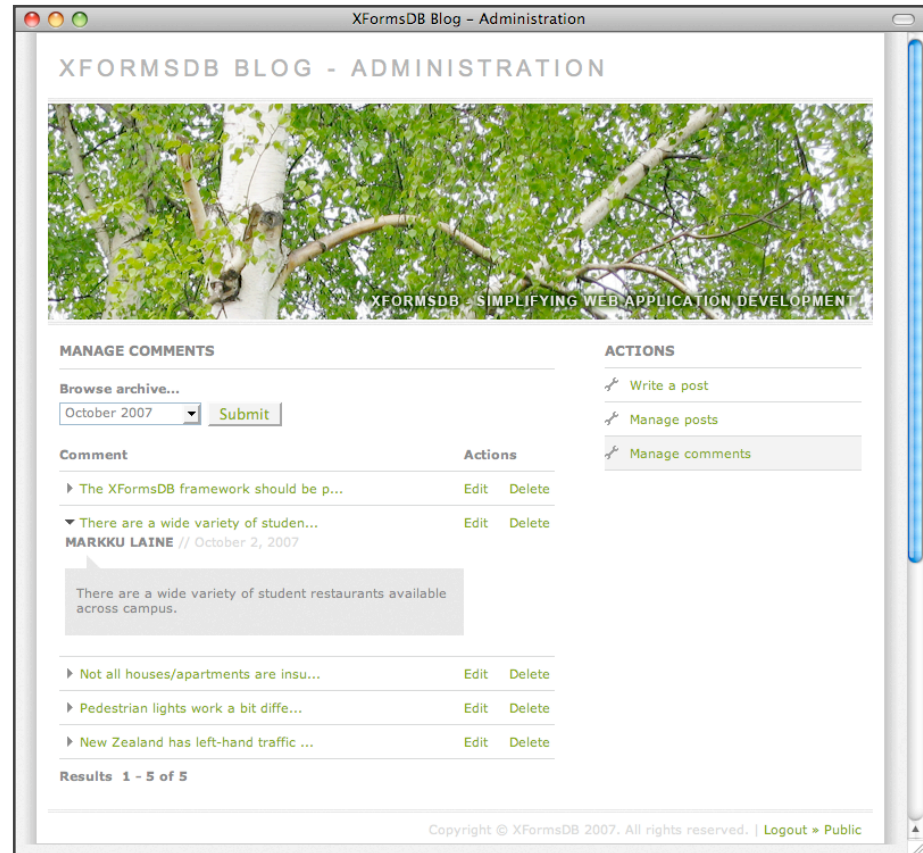


Part V

Sample Web Application: XFormsDB Blog

XFormsDB Blog

- An online journal Web tool for publishing personal contents
- Three (3) separate Web pages and six to ten (6-10) main views
- ~3000 lines of code
 - 9% related to XFormsDB & XQuery
- Normal response times
- [LIVE demo](#)



Part VI

Conclusions

Results

- **The XFormsDB markup language**

- **Naturally extends** the XForms markup language to include common server-side and database related functionalities
- New server-side functionalities can be **easily added** to the language
- For users who are already familiar with XForms, the language is relatively **easy to learn**

- **The XFormsDB framework**

- Supports most common browsers and heterogeneous data sources
- Includes built-in support for synchronized updates
- Allows for the rapid development of entire Web applications using a **single document** and under a **single programming model**

Future Work

- **Refine the syntax of the XFormsDB markup language**
- **Implement support for a subset of XML Binding Language (XBL) 2.0 on the server side**
 - Allows the use of highly reusable components
- **Implement a Web-based visual tool for developing XFormsDB Web applications**
 - Makes the technology accessible to **non-technical users**
- **Add built-in support for OpenID authentication**
 - Users could use an existing account to sign in to XFormsDB Web applications
- **Improve current transaction support**
 - Grouping of synchronized updates

Thank You!

Questions? Comments?

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