Extending XForms with Server-Side Functionality

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Presentation is about...

Web application architectures

XML technologies

End-user programming
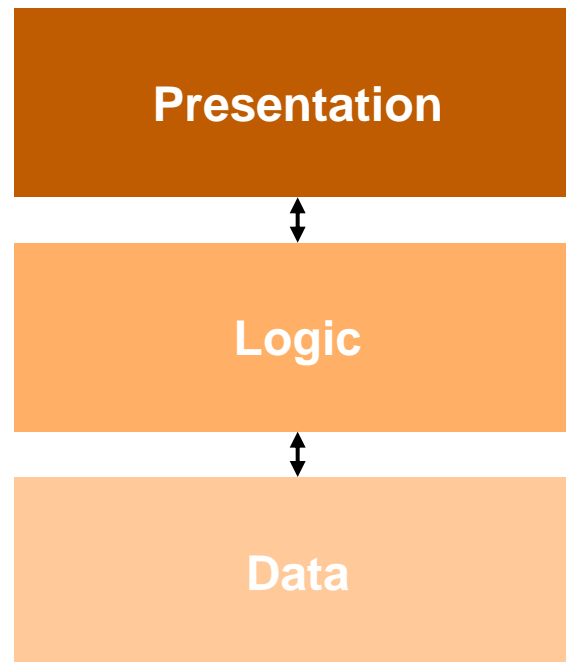
Presentation Outline

Introduction

Proposed approach

Proposed XForms server-side extensions
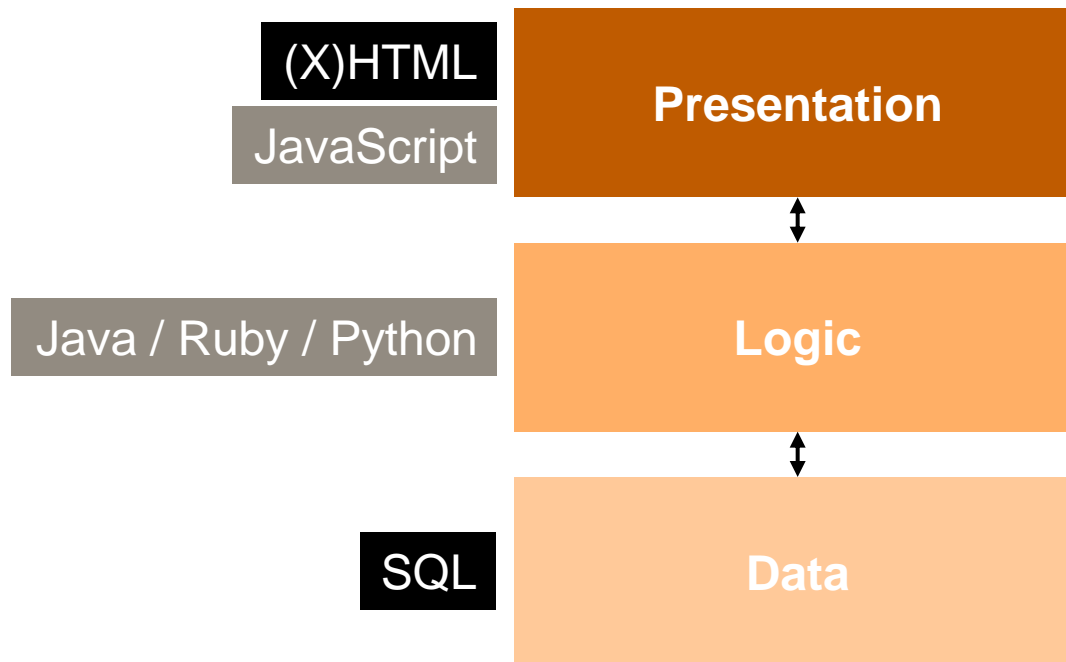
The XFormsDB framework

Conclusions

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Introduction

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Three-Tier Web Application Architecture

Conventional Web Application Architecture

(X)HTML	**Presentation**
JavaScript	

Java / Ruby / Python	**Logic**

SQL	**Data**

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Conventional Web Application Architecture

(X)HTML	**Presentation**	XML
JavaScript		JSON
Object-JSON Mapper		
Java / Ruby / Python	**Logic**	Object
Object-Relational Mapper		
SQL	**Data**	Relational

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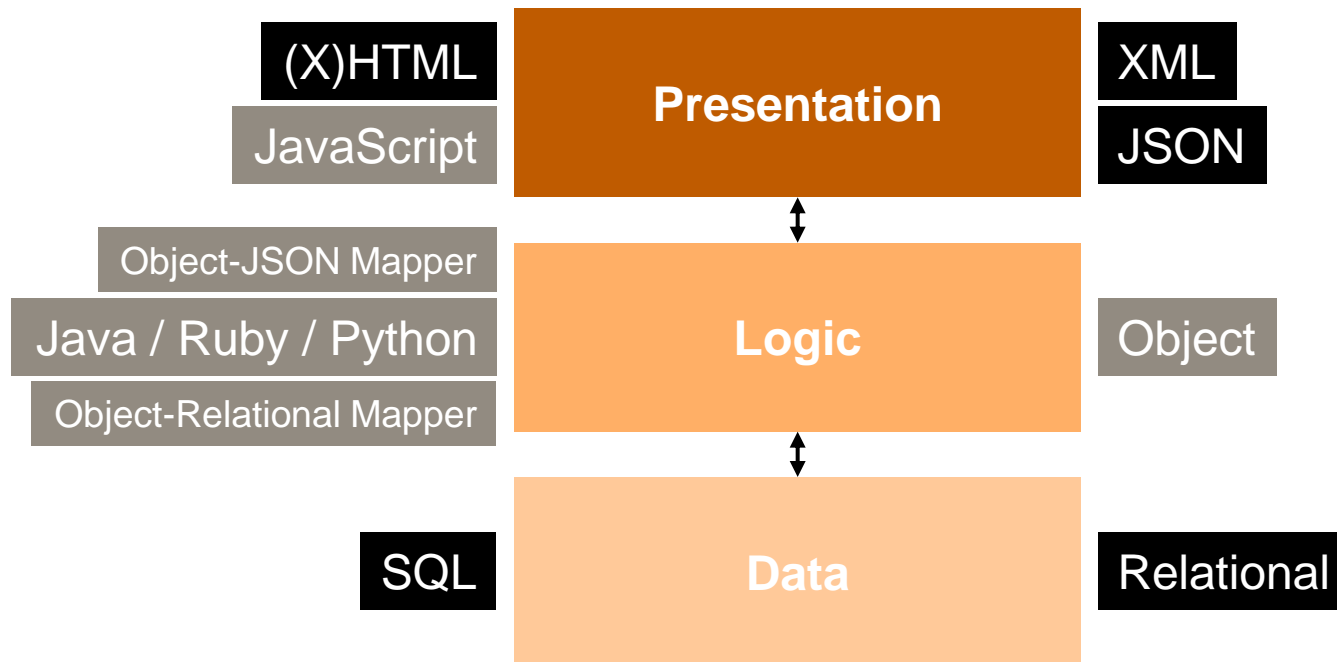
Problems with the Architecture

Multiple programming languages

Multiple data models

Multi-paradigm approach

→ Makes the development of entire Web
applications extremely complex

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How could we simplify the architecture?

...and as a result...

turn more people into Web developers.

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Proposed Approach

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Proposed Approach

One programming language

One data model

One paradigm approach

→ Unified Web application architecture

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Proposed Approach

"Everyone" knows (X)HTML, right?

→ Let's use it as the base language

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What about interaction?

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Proposed Approach

Prefer XForms over JavaScript

→ XForms is even part of XHTML 2.0!

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XForms Web Application Architecture

XHTML

XForms

Presentation

XML

Logic

Data

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Proposed Web Application Architecture

XHTML		
XForms	**Presentation**	XML

↕

XForms	**Logic**	XML

↕

XForms (XPath)	**Data**	XML

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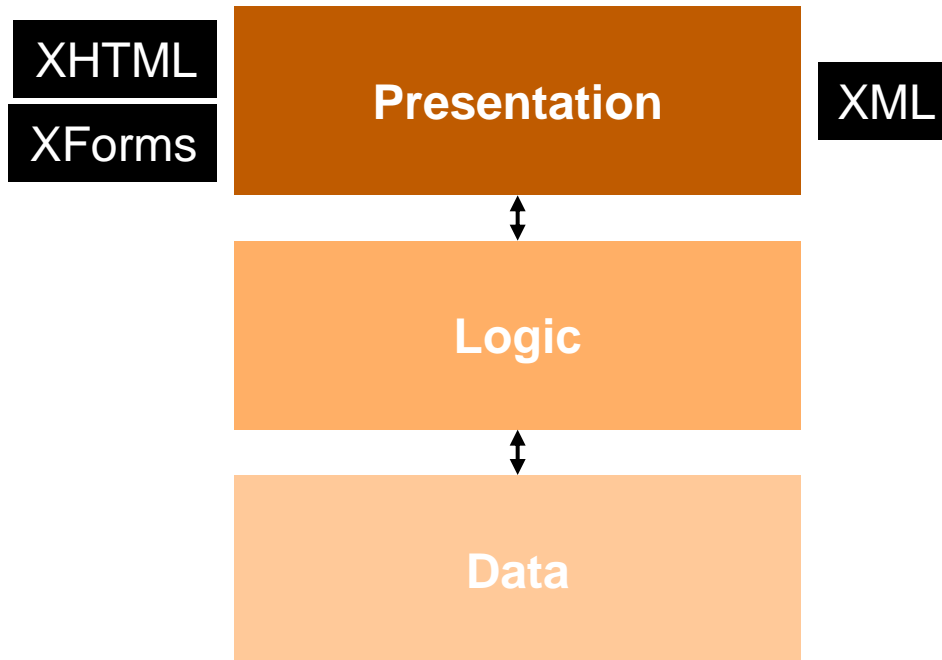
Proposed Web Application Architecture

Proposed XForms Server-Side Extensions

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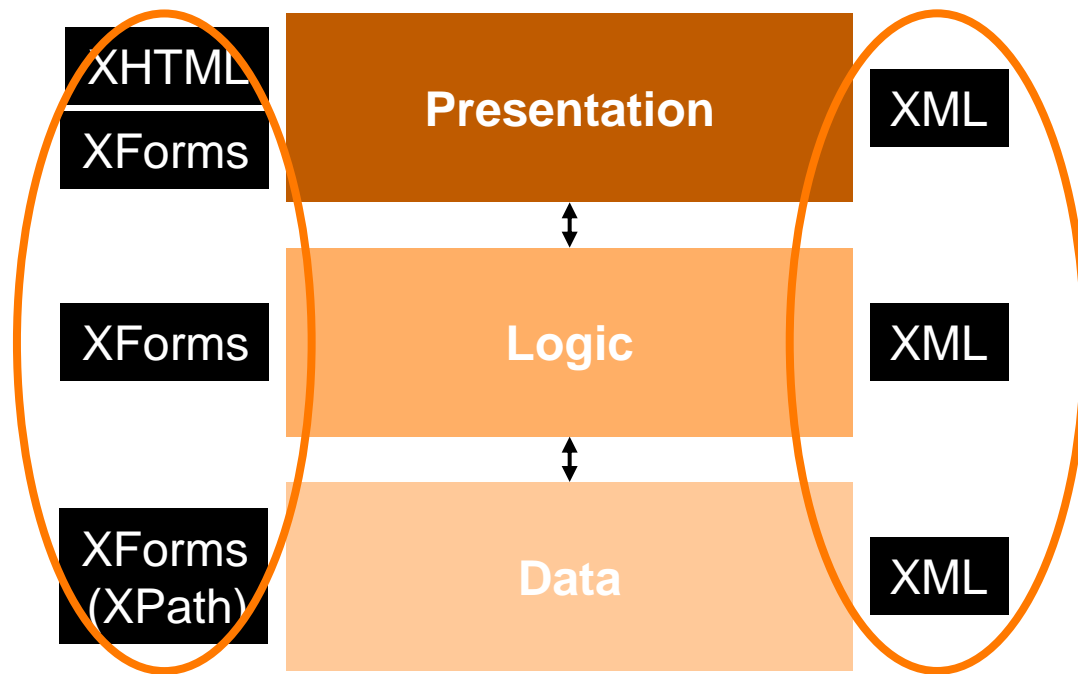
Proposed XForms Server-Side Extensions

Definition of Server-Side Requests

Submission of Server-Side Requests

Notification about Server-Side Errors

Permission Management

Reuse of Code Fragments

→ Seamless integration with XForms

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```xml
<?xml version="1.0" encoding="UTF-8"?>
<html xmlns="http://www.w3.org/1999/xhtml" ...>
  <head>
    <title>Notes</title>
    <xformsdb:include resource="xinc/meta.xinc" />
    <xforms:model>
      <xforms:instance id="notes">
        <dummy xmlns="" />
      </xforms:instance>
      <xformsdb:instance id="select-notes">
        <xformsdb:query datasrc="notes">
          <xformsdb:expression>/root/notes</xformsdb:expression>
        </xformsdb:query>
      </xformsdb:instance>
      <xformsdb:submission id="sub-select-notes" replace="instance"
        instance="notes" requestinstance="select-notes" />
      <xforms:send submission="sub-select-notes" ev:event="xforms-ready" />
    </xforms:model>
  </head>
  <body>
    ...
  </body>
</html>
```

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The XFormsDB Framework

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The XFormsDB Framework

Implements the proposed extensions

Supports all major Web browsers

Supports various data sources

Supports extensibility on all three tiers

Open source!

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Evaluation: Web Applications and Widgets

Conclusions

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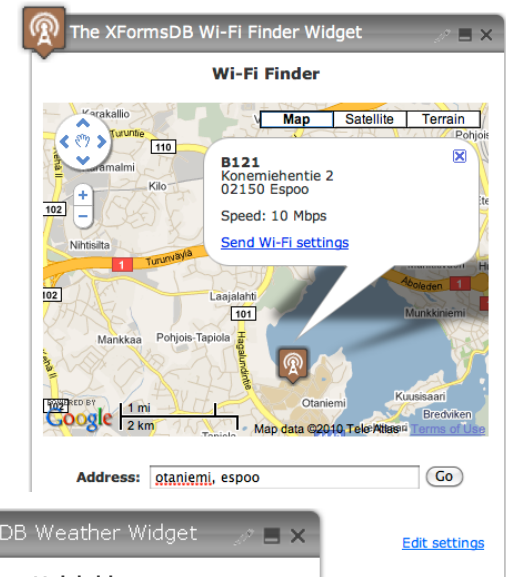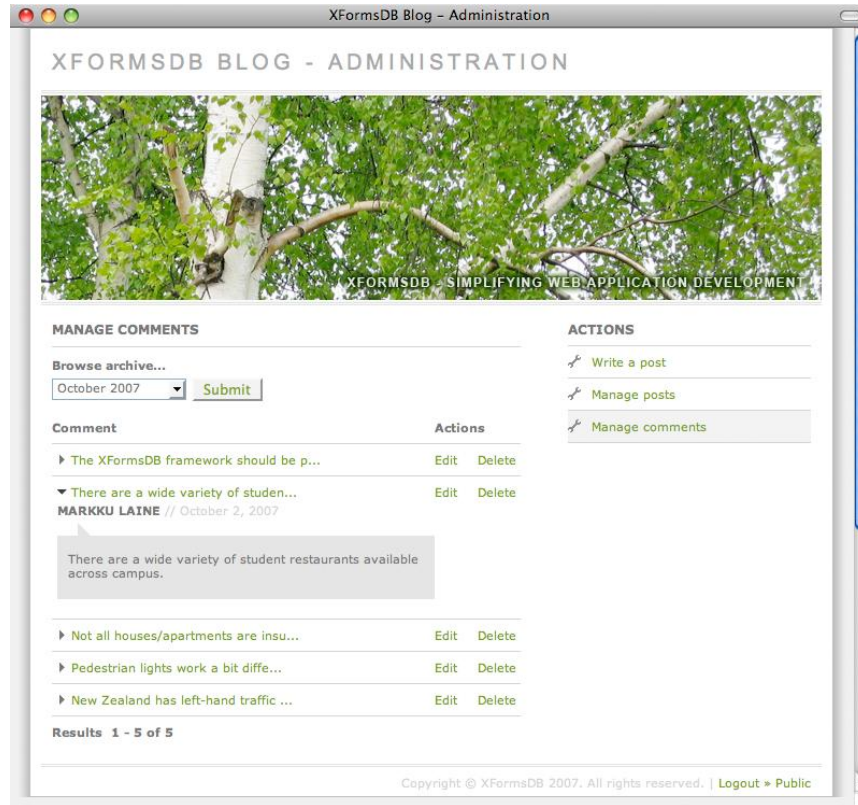
Conclusions

- Entire Web applications can be developed using only one programming paradigm, language, and data model
  - Simplifies the architecture
- Presentation tier technologies provide a good basis for the architecture
  - Especially markup languages (e.g., (X)HTML) due to their wide adoption and ease of use
- Our proposed approach is based on XForms
  - Only a few new elements, good XML knowledge is needed
- The implementing framework, **XFormsDB**, suits well for developing small- and medium-sized Web applications and widgets

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Related Work

- Kuuskeri, J. and Mikkonen, T. "REST Inspired Code Partitioning with a JavaScript Middleware". In *Proceedings of ICWE'10*, pages 244-255, 2010.

- Fourny, F. *et al.* "XQuery in the Browser". In *Proceedings of WWW'09*, pages 1011-1020, 2009.

- Laine, M. *et al.* "Toward Unified Web Application Development". In *IT Professional*, Vol. 13, No. 5, pages 30-36, 2011.

- Litvinova, E., Laine, M., and Vuorimaa, P. "XIDE: Expanding End-User Web Development". In *Proceedings of WEBIST'12*, pages xxx-xxx, 2012.

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Thank you for your attention!

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http://media.tkk.fi/webservices/personnel/markku_laine.html