

Base Technologies of XForms

Applications and Services in Internet 2009 (4 cr)

Jaakko Kangasharju
`jaakko.kangasharju@futurice.com`

Futurice Ltd.

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Base
Technologies
of XForms

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Kangasharju

Introduction

XML
Overview

XML Fundamentals
Schemas and Validity
XPath and XML
Events
XForms Component
Standards

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- Local application UIs built out of common “widgets”
 - Buttons, selection lists, text boxes, . . .
- Service interaction on the Web through browser
 - ⇒ Similar concepts needed

- Part of HTML since nearly the beginning
- Provides basic controls commonly found in UIs
- Form composed of normal content and controls

- Layout needs to be hand-designed
- Not possible to link labels with controls
- Verification logic needs to be duplicated
- Supports only data in name-value pairs

- Define an XML language for describing forms
- Embeddable in any XML language
- Use as much existing XML technology as possible
- Structured model to link information and allow generation of structured documents
- Separation of concerns for device independence
- Competing solution: HTML 5 Forms

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- XML: language for representing structured documents
- Has become extremely widespread in 10 years
- A massive amount of XML-based technologies, the “XML Stack”

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```
<?xml version="1.0" encoding="ISO-8859-1"?>
<book isbn="0-676-97751-0">
  <title>The Portrait</title>
  <author>
    <first>Iain</first>
    <last>Pears</last>
  </author>
</book>
```

- Basic XML suffices for single-source vocabularies
- Mixing vocabularies may lead to conflicts
 - title of a person $\neq$ title of a book
- *XML Namespaces* splits XML names into *namespace* and *local name*
- Now a mandatory part of most XML-based specifications

An XML Document with Namespaces

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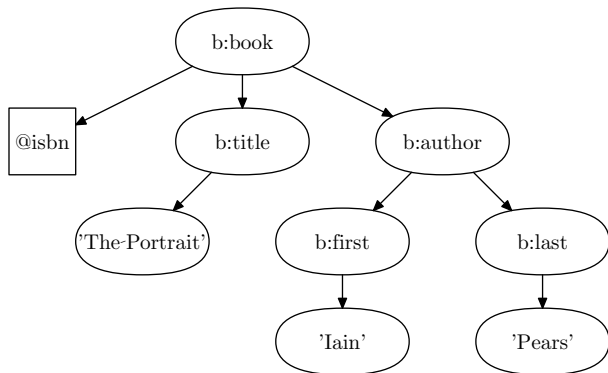
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```
<?xml version="1.0" encoding="ISO-8859-1"?>
<bookshelf>
  <p:person xmlns:p="http://example.org/person">
    <p:name>
      <p:first>Jaakko</p:first>
      <p:last>Kangasharju</p:last>
    </p:name>
  </p:person>
  <b:book xmlns:b="http://example.com/book"
    isbn="0-676-97751-0">
    ...
  </b:book>
</bookshelf>
```

- XML specification: An XML document is a sequence of characters matching the XML document grammar
- Accessing structure better through *abstract* rather than *concrete* syntax trees
- An XML data model gives an abstract structured (usually tree-like) view of XML
- Several explicit and implicit models: Infoset, XPath DM, any XML API



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- An application rarely processes all kinds of XML documents
- A schema language describes (usually declaratively) an expected XML structure
- DTD: Original schema language for XML
 - Has a different syntax
 - Does not handle namespaces (easily)
 - Does not have data types

- XML Schema: W3C effort to create a schema language for XML
- Supports namespaces and data types, uses XML syntax
- Widely used in business information processing
- Criticisms:
 - Too much influence from database community
 - No clear formalism, too ad hoc
 - Data typing not a proper type system
 - Retains DTD ability to modify document
- Promoted alternative: RELAX NG

XML Schema Example

```
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
            elementFormDefault="qualified"
            targetNamespace="http://example.com/book"
            xmlns:b="http://example.com/book">
  <xs:element name="book">
    <xs:complexType>
      <xs:sequence>
        <xs:element ref="b:title"/>
        <xs:element ref="b:author"/>
      </xs:sequence>
      <xs:attribute name="isbn" use="required">
        <xs:simpleType>
          <xs:restriction base="xs:string">
            <xs:pattern value="[\-0-9X] +"/>
          </xs:restriction>
        </xs:simpleType>
      </xs:attribute>
    </xs:complexType>
  </xs:element>
  ...
</xs:schema>
```

- A schema processor *validates* an XML document
- Each element and attribute *annotated* with its (named) type
- XML Schema produces the post-schema-validation infoset (PSVI)

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- Tree-structured XML needs a way to address pieces of information
- XPath: standard embeddable language for this
- Syntax reminiscent of regular expressions
- Capable of matching arbitrary tree structures

- Get the names of all books on the bookshelf
 - `/bookshelf/b:book/b:title`

- Get the names of all books on the bookshelf
 - `/bookshelf/b:book/b:title`
- Get the first book by the author with last name “Pears”
 - `/bookshelf/b:book[b:name/b:last='Pears']/b:title`

- User interfaces need to respond to user actions
- DOM Events allow events triggered at XML document nodes and handled somewhere in the XML tree
- Events propagate downwards from root to target and then upwards from target to root
- XML Events allow embedding DOM event handlers into XML documents

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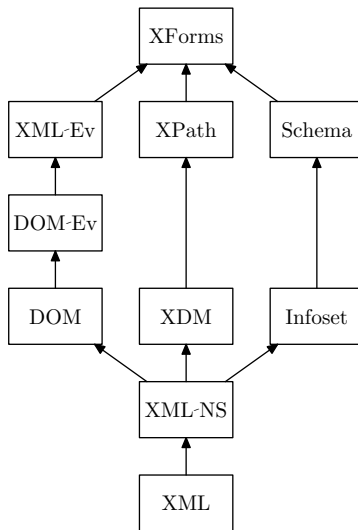
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Have a good week!