Applications for the Mobile Web

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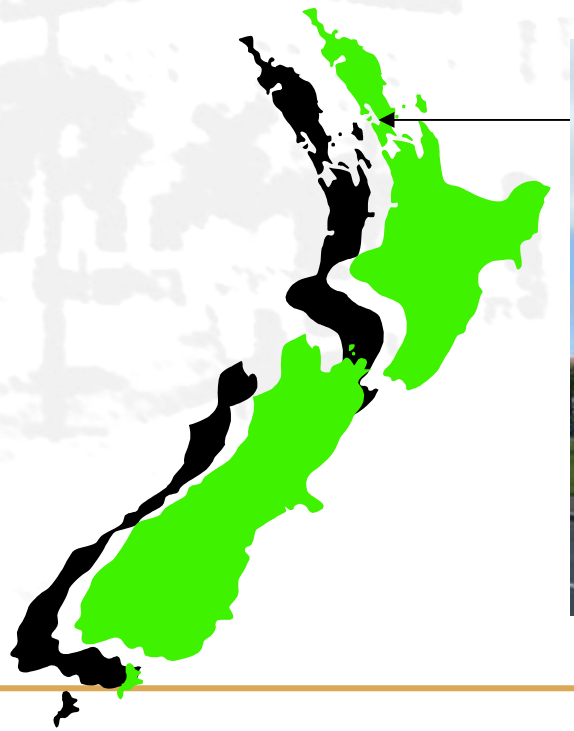

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Agenda

- Adaptivity
- Markup languages
- XML and Java architectures

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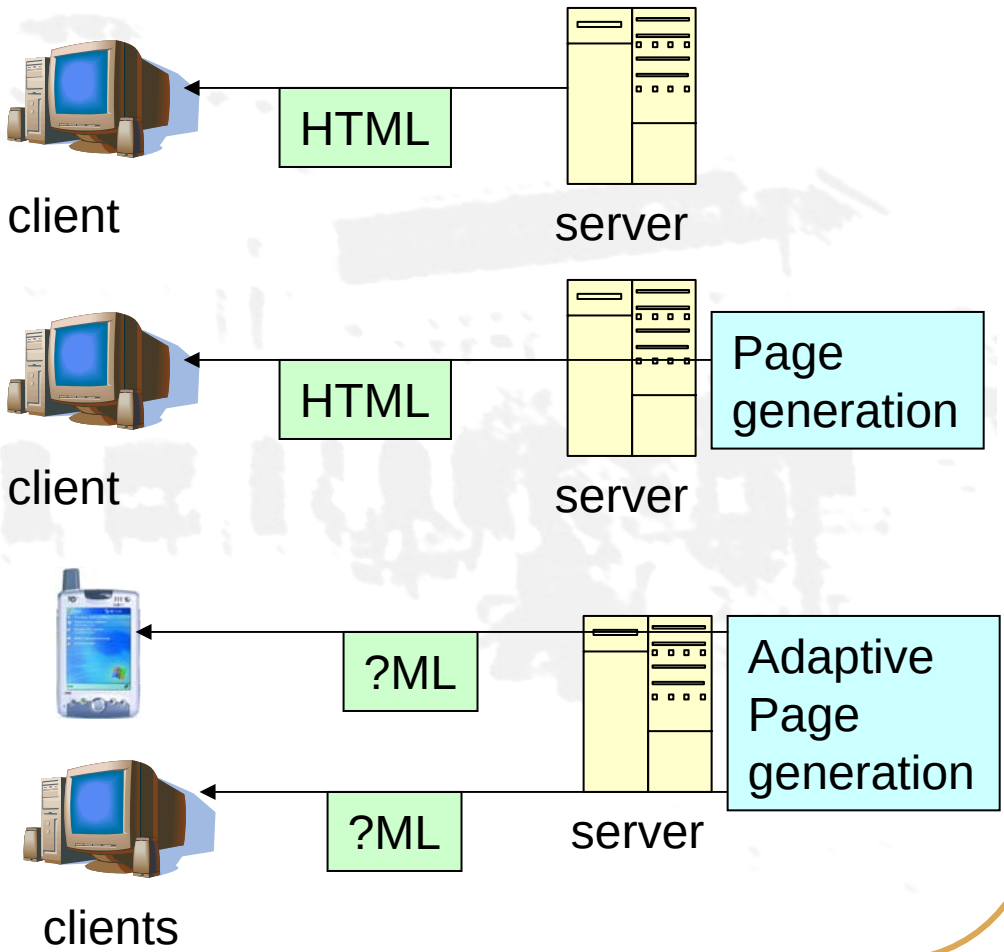
Web Application Evolution

- Static content
- Dynamic content
- Adaptive content



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Adaptivity

- Adaptive systems have three aspects
- adaptive content:
  - providing different content to users depending on their profiles
- adaptive navigation
  - changing the selection, presentation and/or ordering of anchors depending on user profile
- adaptive presentation
  - changing the presentation depending on device, among other things

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Adaptive Presentation

- It is becoming increasingly necessary to adapt presentation to different device types
  - Desk top browsers
  - PDA browsers
  - Mobile phone micro browsers
- Different devices have different presentation capabilities

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HTML Limitations

- ‘Traditional’ HTML combines content, structure and presentation
  - <FONT COLOR=“RED”><P>Hello…</P>
- Early versions were not well formed
  - <FONT SIZE=2>
<p>
- Therefore they could not be validated either
- Browser processing can arbitrarily fail

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XML, Semi Structured Data

- Irregular data structures
- Different instances can be derived from a single structure
- Self describing + human readable

1 3 2006

versus

```
<date>
        <day>1</day>
        <month>3</month>
        <year>2006</year>
</date>
```

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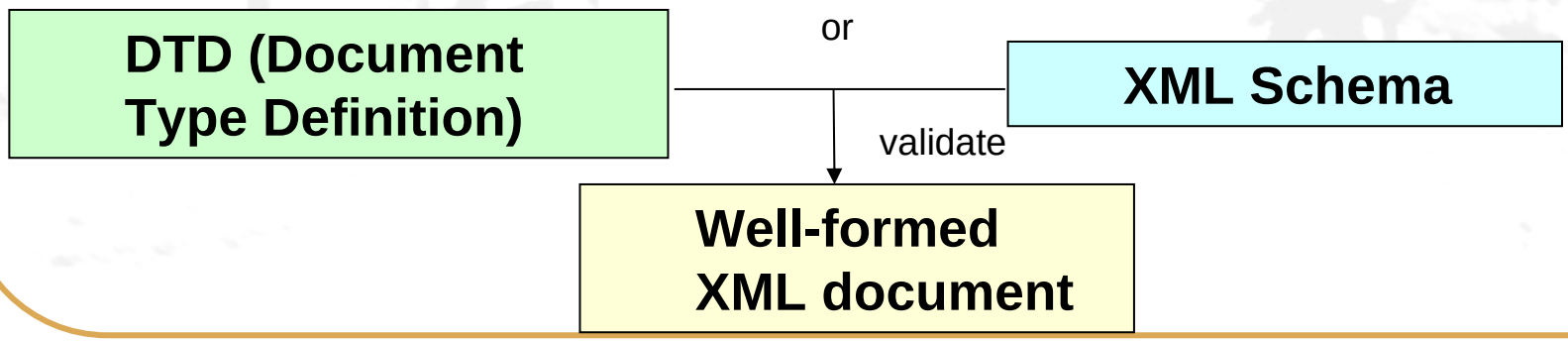
XML For Content

- Unlike HTML, it can be customised
  - New tags can be defined
- This makes it ideal for data representation
- As well as being ‘well-formed’, an XML document can be ‘valid’
  - Validated using either a DTD or XML-Schema



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XML Über Alles

- Configuration (better than properties files)
- B2B messaging
- Web Services / SOA
- Data storage
- Metadata

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CSS For Presentation

- Cascading Style Sheets (CSS) can be used to separate out presentation from the rest of the document

```
h2 {font-style: italic; color: blue}
p  {font-size: 20}
.companyname {color: red}
```

```
<h2> Welcome to <span class="companyname"> stuff.com </span> </h2>
```

- Not all client types will be able to support CSS
  - Process on the server instead

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XHTML For Structure

- XHTML is well formed and valid HTML
  - Removes the presentation tags from the HTML syntax
- Has a special ‘mobile’ version
  - XHTML-MP (Mobile Profile)

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XSLT to Generate Markup

- XML is a metalanguage
- XHTML is a markup language
- XSLT (eXtensible Stylesheet Language Transformation) can generate one from the other
  - Can use XPath for simple queries

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Mobile Client Markup

- There are a number of different types of mark-up for mobile devices
  - WML (Wireless Markup Language)
    - WAP phones
    - WML-2 for backward compatibility, otherwise superseded by XHTML-MP
  - cHTML (Compact HTML)
    - For iMODE phones
  - XHTML-Basic and XHTML-MP (Mobile Profile)
    - XHTML compliant subsets

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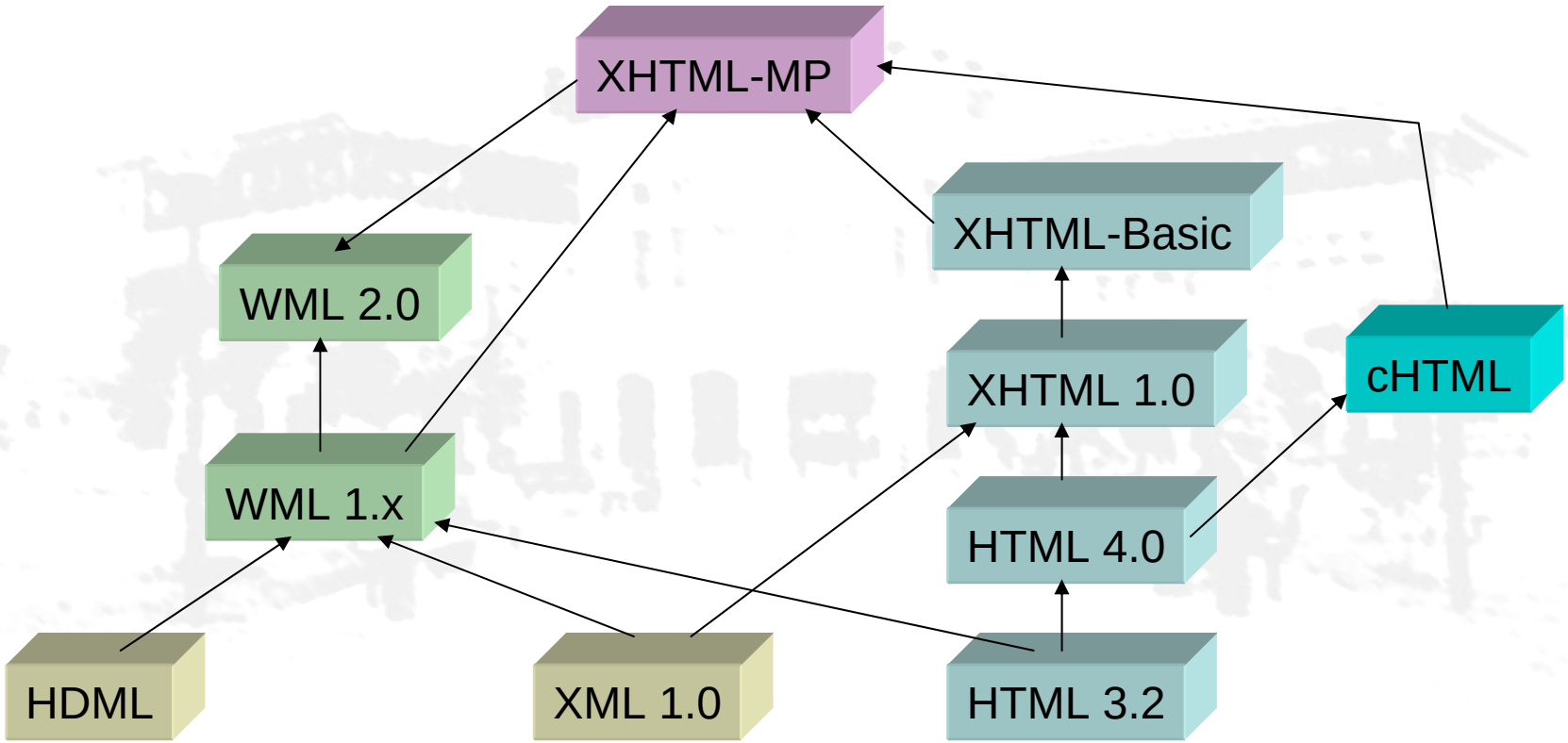
Mark-up Language Evolution



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Client Capability Identification

- Multiple page formats can be generated on the server for different types of client
  - Uses the ‘User-agent’ information sent within the micro-browser’s request header or more sophisticated Custom Configuration / Personal Profile (CC/PP)

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Redirectors

- Resources can be represented in raw form in XML and formatted using the eXtensible Stylesheet Language (XSL) and/or Cascading Style Sheets (CSS)
  - Some thin clients can process the style sheets locally (depending on their browser type)

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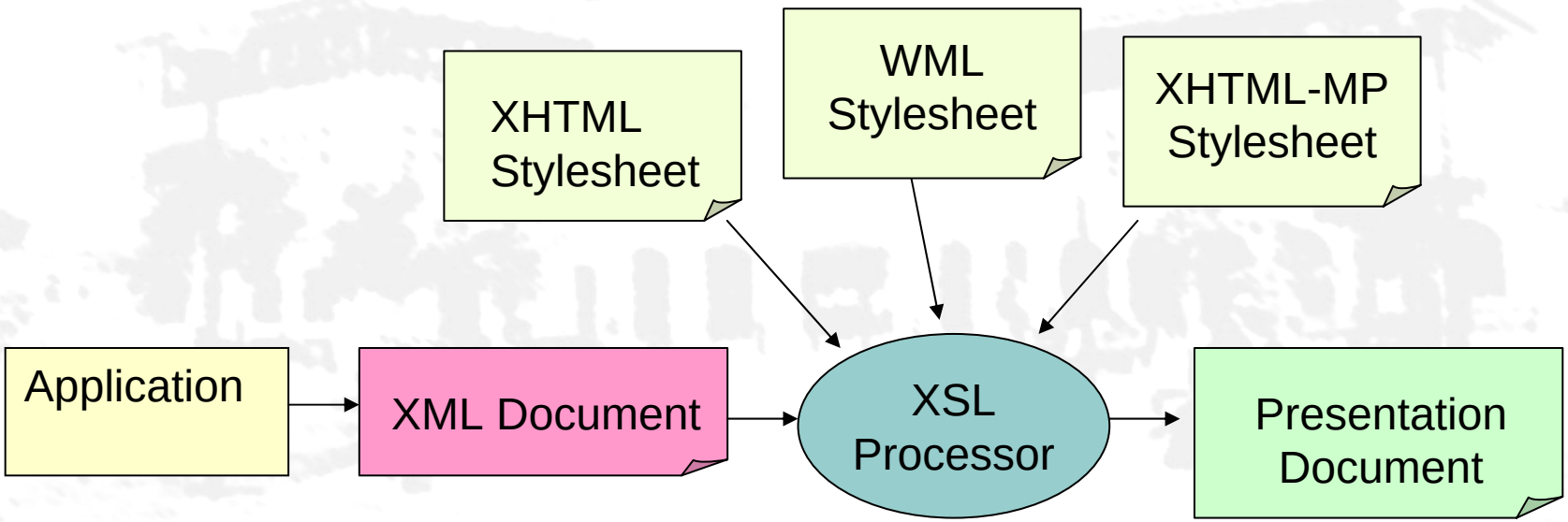
Content Transformation



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Java Frameworks

- Wireless Universal Resource File (WURFL)
  - Able to recognise user agent information and identify different devices
- Wireless Abstraction Library (WALL)
  - A tag library that uses WURFL and generates device specific markup
- Cocoon
  - A complete ‘pipeline’ framework

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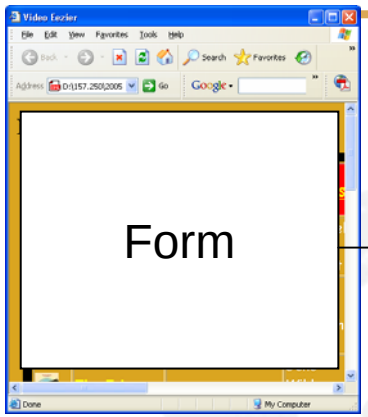
Client Centric Architecture



Client browser

http request

http response

XHTML
XML
CSS
XSLT

Server

Controller Servlet

Server-side action

Model components

Server page

Database

Transformation on client

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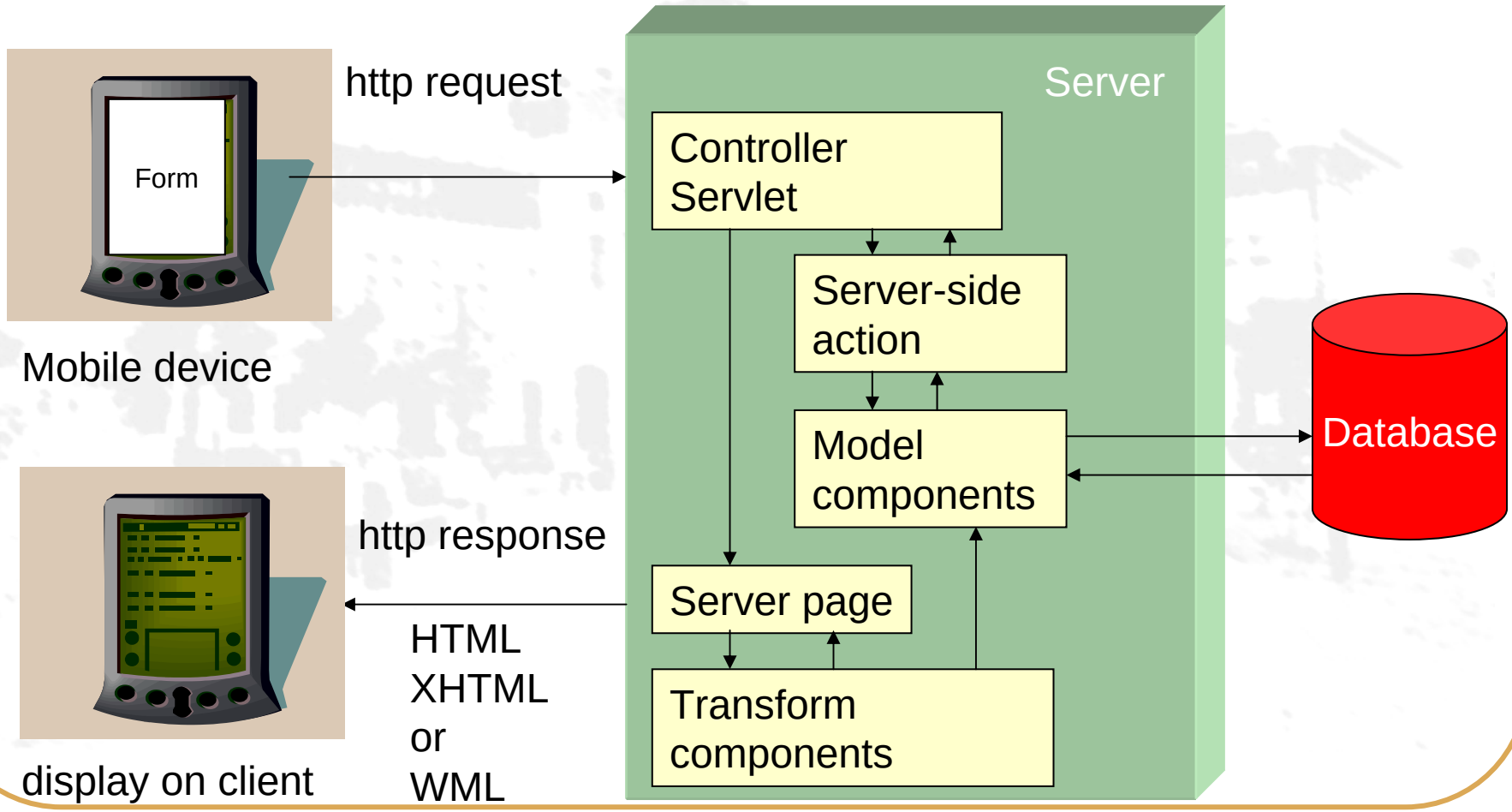
Server Centric Architecture



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Adaptive Application Intent

- To present markup to the client using dynamic XML transforms running on the server
- To query data from a relational database and transform it into XML
- To use standard libraries where possible

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Web Application Components

- Client page with HTML form to send http request parameters (SQL query)
- Server page to receive request and delegate to server side Java Bean
- Java bean to execute SQL query against database using JDBC and receive result set
- Bean method to convert result set into a string
- Tag library to transform XML to HTML (with CSS) using XSLT

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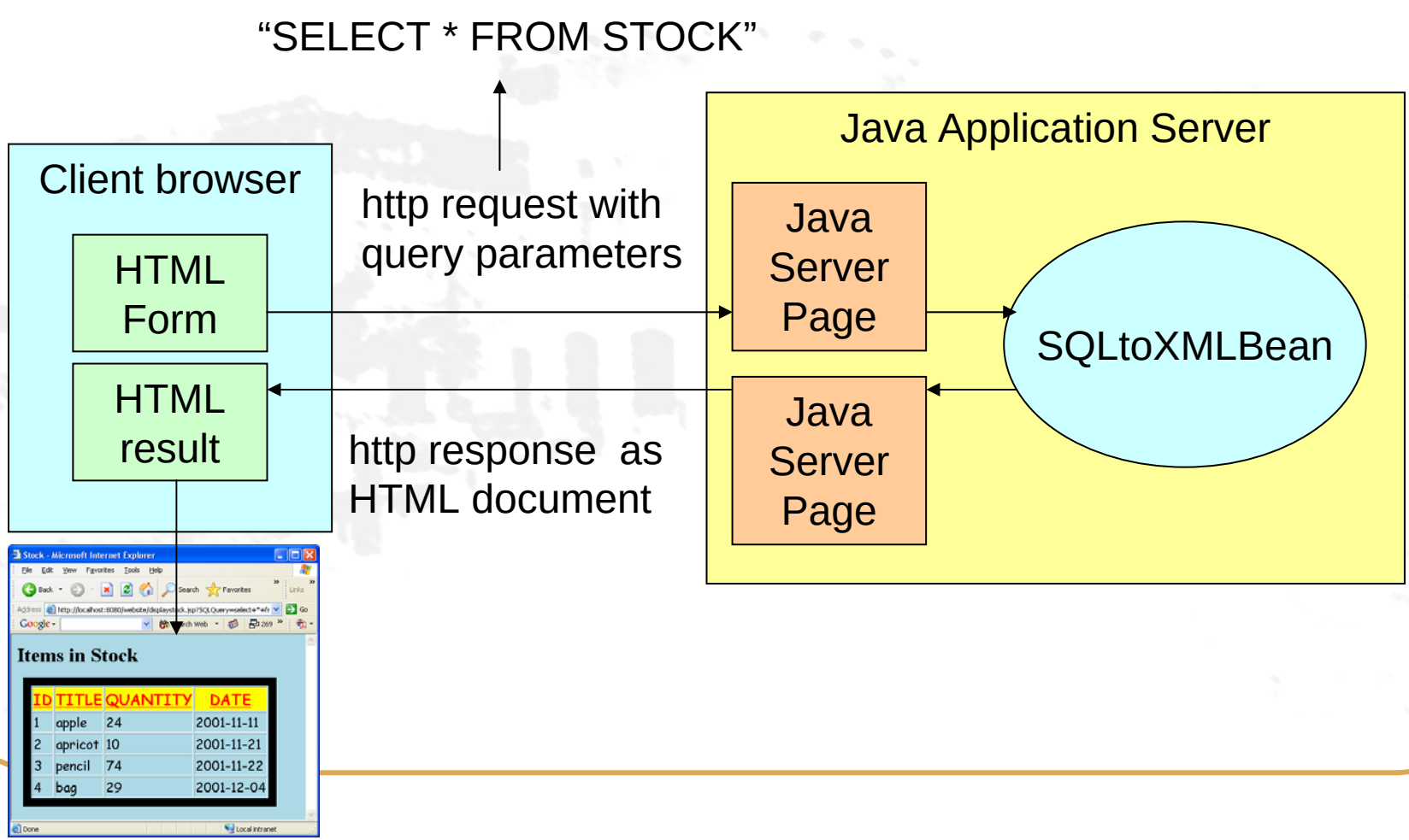
Client Request



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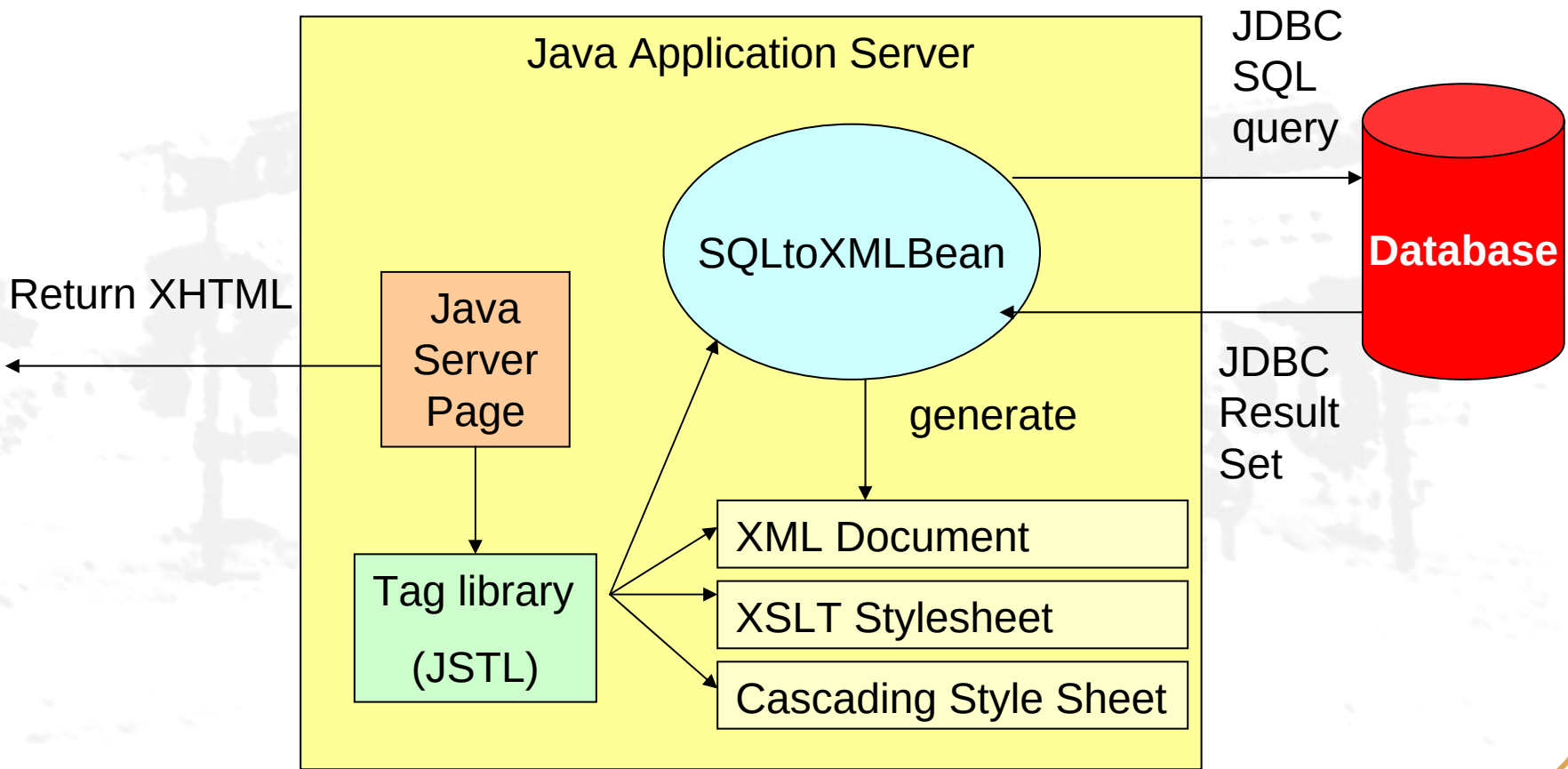
Server Side Transformation



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What Is The JSTL?

- JSP Standard Tag Library
- A standard tag library for JSPs
- Provides tags in four libraries
  - Core
  - Internationalization and formatting
  - Database access
  - XML processing

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Response JSP

- Uses standard tag libraries and standard JSP bean tags

```
<%@ taglib uri="http://java.sun.com/jstl/core" prefix="c" %>
<%@ taglib uri="http://java.sun.com/jstl/xml" prefix="x" %>

<jsp:useBean id="transformer" class="webapp.classes.SQLtoXMLBean" />
<jsp:setProperty name="transformer" property="SQLQuery" />

<c:import url="./stock.xsl" var="xslt"  />

<x:transform xml="${transformer.XMLDocument}" xslt="${xslt}" />
```

Request parameter name

Readable bean property

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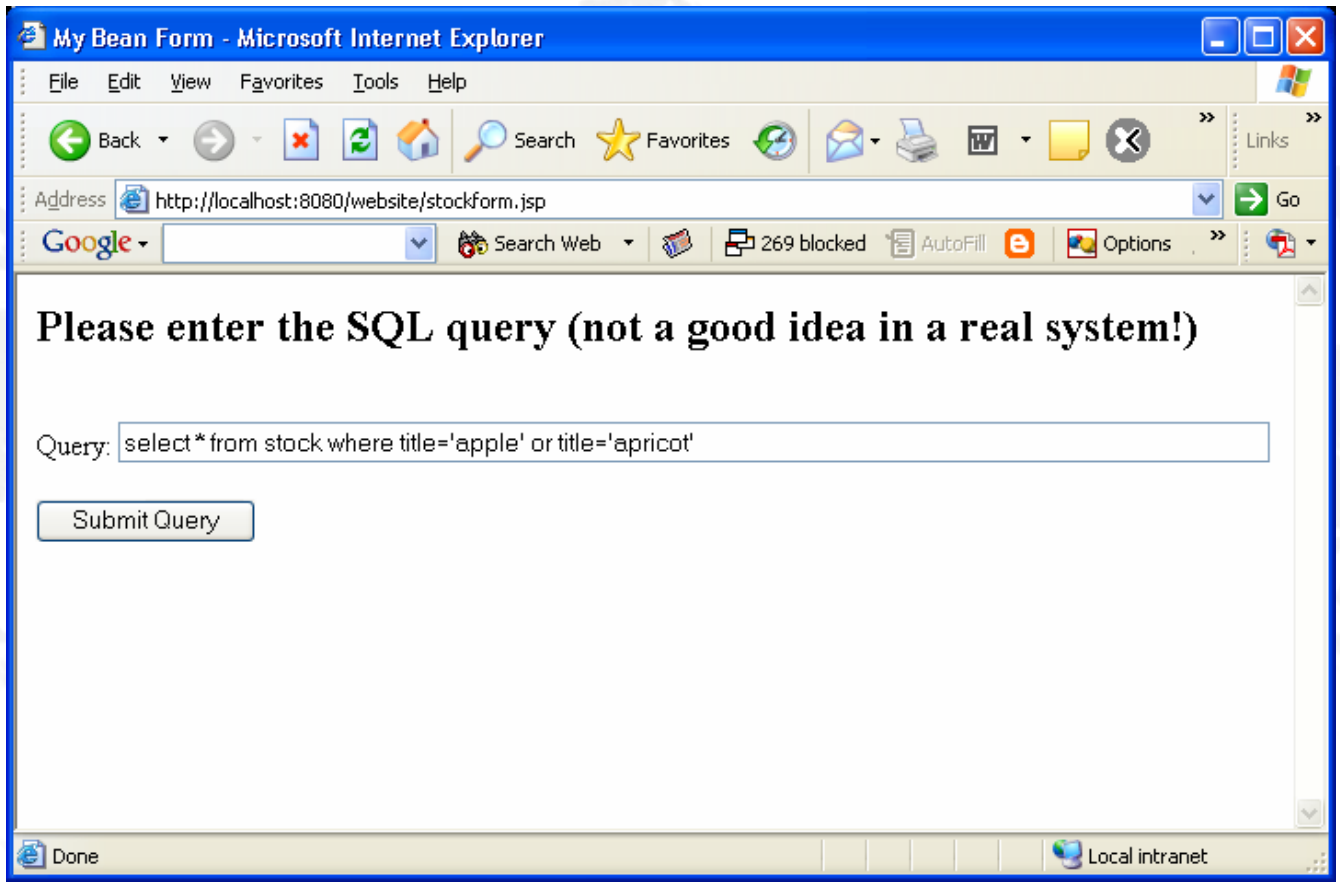
Sample Input



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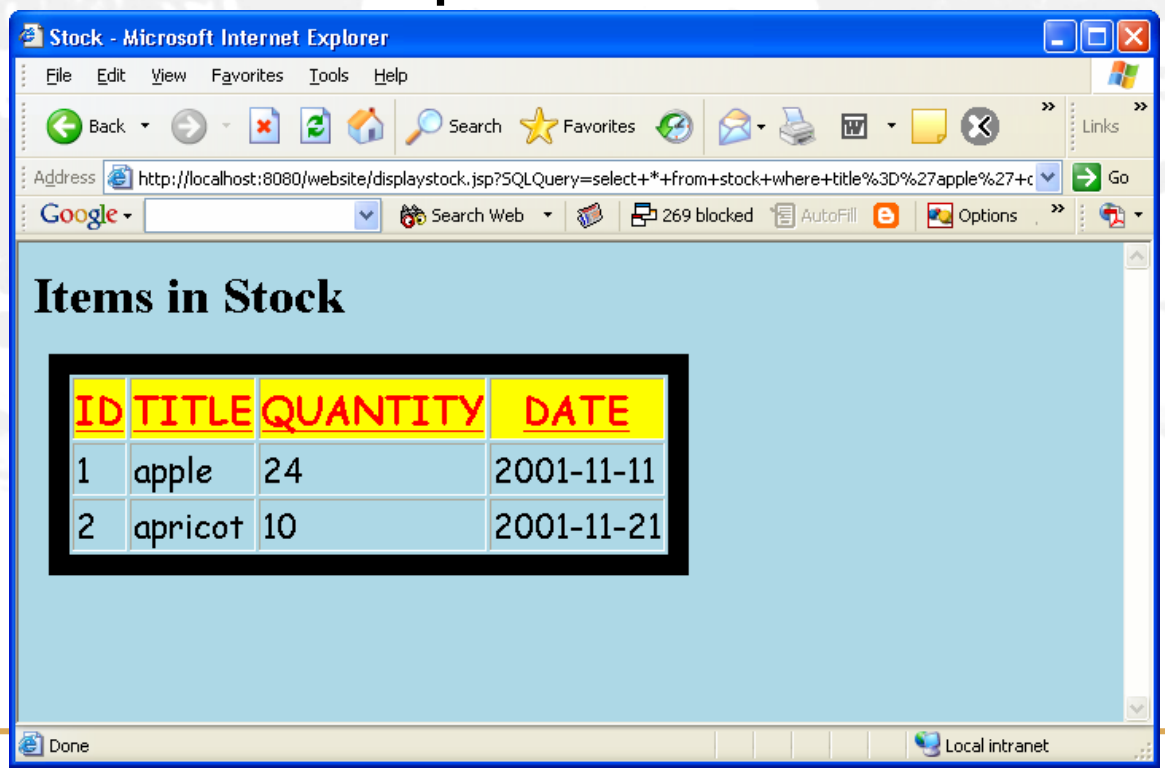
Sample Output

- Note that parameters are appended to the URL for GET requests



Adaptive Web Application Research Activity

- Vodafone New Zealand Mobile Learning project
  - http://www.mclassroom.com/WebApp/
- Code for forthcoming text book (Still in development)
  - http://www.mclassroom.com/WebHomeCover/
  - http://www.mclassroom.com/WebHomeCover/wallmenu.jsp