core WEB programming

XLST Processing with Java

Agenda

- **XSLT Overview**
- **Understanding XPath notation**
- **Processing elements in XSLT templates**
- **XSLT installation and setup**
- **An XSL Transformer**
- **Example:**
  - Document Editor
  - XSLT custom tag

Extensible Stylesheet Language Transformations

- **XSLT applies user-defined transformations to an XML document**
  - Transformed output can be:
    - HTML, XML, WML, etc.
- **XSLT Versions**
  - XSLT 1.0 (Nov 1999)
  - XSLT 2.0 (Nov 2002)
    - Namespace addition
  - Official Website for XSLT
    - `http://www.w3.org/Style/XSL/`

Extensible Stylesheet Language (XSL)

- **XSL is a language for expressing stylesheets**
  - XSLT
    - Transformation of XML document
    - `http://www.w3.org/TR/xslt`
  - XPath
    - An expression language used by XSLT to locate elements and/or attributes within an XML document
    - `http://www.w3.org/TR/xpath`
  - XSL-FO (Formatting Objects)
    - Specifies the formatting properties for rendering the document
    - `http://www.w3.org/TR/XSL/XSL-FO/`

XSLT Advantages and Disadvantages

- **Advantages**
  - Easy to merge XML data into a presentation
  - More resilient to changes in the details of the XML documents than low-level DOM and SAX
  - Database queries can be retuned in XML
    - Insensitive to column order
- **Disadvantages**
  - Memory intensive and suffers a performance penalty
  - Difficult to implement complicated business rules
  - Have to learn a new language
  - Can't change the value of variables (requires recursion)

XSLT Parsers

- **Apache Xalan**
  - http://xml.apache.org/xalan/
- **Oracle**
  - http://technet.oracle.com/tech/xml/
- **Saxon**
  - http://saxon.sourceforge.net/
  - Written by Michael Kay
- **Microsoft's XML Parser 4.0 (MSXML)**
  - http://www.microsoft.com/xml/

XSLT Installation and Setup (JDK 1.4)

- **All the necessary classes are included with JDK 1.4**
  - See `javax.xml.transform` package
- **For XSLT with JDK 1.3 see following viewgraphs**

XSLT Installation and Setup (JDK 1.3)

1. **Download a XSLT compliant parser**
   - XSLT parsers at `http://www.xmlsoftware.com/xslt/`
   - Recommend Apache Xalan-J 2.4.1 parser at `http://xml.apache.org/xalan-j/`
     - Xalan-Java implementation is bundled in `xalan.jar`
     - Xalan also requires `xml-apis.jar`

XSLT Installation and Setup (JDK 1.3, continued)

2. **Download a SAX 2-compliant parser**
   - Java-based XML parsers at `http://www.xml.com/pub/rg/Java_Parsers`
   - Recommend Apache Xerces-J 2.2.x parser at `http://xml.apache.org/xerces-j/`
   - Note that Xerces-J 2.2.0 is bundled with the Xalan-J 2.4.1 download
     - Xerces-Java implementation is bundled in `xercesImpl.jar`
     - Xerces also requires `xml-apis.jar`

XSLT Installation and Setup (continued)

3. **Download the Java API for XML Processing (JAXP)**
   - JAXP defines TrAX, a small layer on top of SAX and DOM which supports specifying transformers through system properties versus hard coded values
   - See `http://java.sun.com/xml/`
   - Note that TrAX is incorporated in Xalan-J
4. **Bookmark the Java XSLT API**
   - Xalan-Java API is located at `http://xml.apache.org/xalan-j/apidocs/`

XSLT Installation and Setup (continued)

5. **Set your `CLASSPATH` to include the XSLT and XML parser classes**

```
set CLASSPATH=xalan_install_dir\xalan.jar;
  xalan_install_dir\xercesImpl.jar;
  xalan_install_dir\xml-apis.jar;%CLASSPATH%
```

or

```
setenv CLASSPATH xalan_install_dir/xalan.jar:
  xalan_install_dir/xercesImpl.jar:
  xalan_install_dir/xml-apis.jar:$CLASSPATH
```

- For Web deployment, place `xalan.jar`, `xml-apis.jar`, and `xercesImpl.jar` in your `WEB-INF/lib` directory

XSL Transformations

- **Use**
  - XPath to identify (select) parts of an XML document
  - XSLT templates to apply transformations
- **Requires**
  - Well formed XML document
  - XSL document (style sheet) that contains formatting and transformation templates
  - XSLT parser to perform the transformation

Simple XSLT Example

- **The following example illustrates transforming an XML document into an HMTL TABLE**
  - Input
    - Style sheet (XSL): **`table.xsl`**
    - XML document: **`acronym.xml`**
  - Output
    - HTML document: **`acronym.html`**

XSLT Stylesheet: table.xsl

```
<?xml version="1.0"?>
<xsl:stylesheet version="1.0"
  xmlns:xsl="http://www.w3.org/1999/XSL/Transform">
  <xsl:output method="html" />
  <xsl:template match="/">
    <TABLE CELLPADDING="3" BORDER="1" ALIGN="CENTER">
      <!-- Build table header, by selecting the
           name of each element in the first ROW.  -->
      <TR><TH></TH>
          <xsl:for-each select="ROWSET/ROW[1]/*">
            <TH><xsl:value-of select="name()" /></TH>
          </xsl:for-each>
      </TR>
      <!-- Apply template to build table rows -->
      <xsl:apply-templates select="ROWSET" />
    </TABLE>
  </xsl:template>
  ...
```

XSLT Stylesheet: table.xsl (continues)

```
...

<xsl:template match="ROW">
  <TR><TD><xsl:number /></TD>
          <!-- Select all elements in the ROW.
               Populate each TD with the corresponding
               text value of the element.
               Note:    produces   by Xalan  -->
          <xsl:for-each select="*">
             <TD><xsl:value-of select="." /> </TD>
          </xsl:for-each>
  </TR>
 </xsl:template>
</xsl:stylesheet>
```


XML Document: acronyms.xml

```
<?xml version="1.0"?>
<ROWSET>
  <ROW>
    <ACRONYM>DOM</ACRONYM>
    <DESCRIPTION>Document Object Model</DESCRIPTION>
  </ROW>
  <ROW>
    <ACRONYM>JAXP</ACRONYM>
    <DESCRIPTION>Java AIP for XML Parsing</DESCRIPTION>
  </ROW>
  <ROW>
    <ACRONYM>SAX</ACRONYM>
    <DESCRIPTION>Simple API for XML</DESCRIPTION>
  </ROW>
  <ROW>
    <ACRONYM>TrAX</ACRONYM>
    <DESCRIPTION>Transformation API for XML</DESCRIPTION>
  </ROW>
  <ROW>
    <ACRONYM>XSLT</ACRONYM>
    <DESCRIPTION>XSL Transformation</DESCRIPTION>
  </ROW>
</ROWSET>
```

Transforming the XML Document

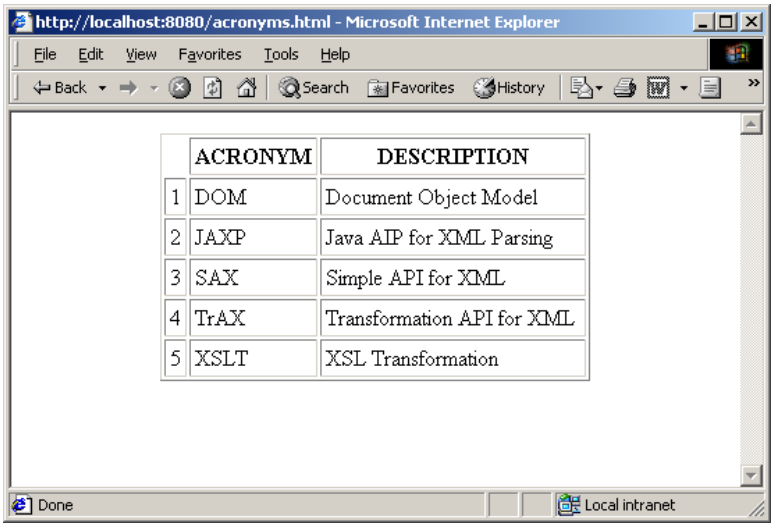
- **Use Xalan command-line interface**

```
> java org.apache.xalan.xslt.Process
          -in acronyms.xml
          -xsl table.xsl
          -out acronyms.html
```


Transformation Result

```
<TABLE ALIGN="CENTER" BORDER="1" CELLPADDING="3">
<TR>
<TH></TH><TH>ACRONYM</TH><TH>DESCRIPTION</TH>
</TR>
<TR>
<TD>1</TD><TD>DOM </TD><TD>Document Object Model </TD>
</TR>
<TR>
<TD>2</TD><TD>JAXP </TD><TD>Java AIP for XML Parsing </TD>
</TR>
<TR>
<TD>3</TD><TD>SAX </TD><TD>Simple API for XML </TD>
</TR>
<TR>
<TD>4</TD><TD>TrAX </TD><TD>Transformation API for
   XML </TD>
</TR>
<TR>
<TD>5</TD><TD>XSLT </TD><TD>XSL Transformation </TD>
</TR>
</TABLE>
```

Transformation Result (continued)



	ACRONYM	DESCRIPTION
1	DOM	Document Object Model
2	JAXP	Java AIP for XML Parsing
3	SAX	Simple API for XML
4	TrAX	Transformation API for XML
5	XSLT	XSL Transformation

Understanding XPath

- **XPath is an *expression language* to:**
  - Identify parts (location paths) of the input document
    - Commonly used in **`match`** and **`select`** attributes in XSLT elements

```
<xsl:template match="/name/first" >
  ...
</xsl:template>
```

  - Test boolean conditions
  - Manipulate strings
  - Perform numerical calculations

Location Paths

- **Location paths are interpreted with respect to a context**
  - Or simply, the node in the tree from which the expression is evaluated
- **The evaluated expression represents a set of nodes matching the condition**
  - Possibly the empty set if no matches occur
- **A location path consists of one or more location steps separated by / or //**
- **Paths can be relative or absolute**

Simple Location Paths

- **Matching the root node**
  - A leading / indicates the root node

```
<xsl:template match="/" >
  <!-- Matches the root node.      -->
</xsl:template>
```

- **Matching all children**
  - Use the * wildcard to select all element nodes in the current context

```
<xsl:template match="*" >
  <!-- Matches all children nodes. -->
</xsl:template>
```

Simple Location Paths (continued)

- **Matching an element**
  - Use / to separate elements when referring to a child
  - Use // to indicate that zero or more elements may occur between the slashes

```
<xsl:template match="/catalog/*/manufacturer" >
   <!--  Match all manufacturer elements     -->
   <!--  that are a grandchild of catalog.   -->
</xsl:template>

<xsl:template match="order//item" >
   <!--  Match all item elements that are    -->
   <!--  descendants of order.                -->
</xsl:template
```


Matching with Predicates

- **Matching a specific element**
  - Use […] as a predicate filter to select a *particular* context node
  - The predicate is evaluated as a boolean expression; if the condition is true, then the node is selected

```
<xsl:template match="author/name[middle]" >
  <!-- Match all name elements that have an      -->
  <!-- author parent and a middle child.         -->
</xsl:template>


<xsl:template match="/ROWSET/ROW[1]" >
  <!-- Match the first ROW element that is    -->
  <!-- a child of ROWSET (from the root).           -->
</xsl:template>
```

Matching with Predicates (continued)

- **Matching a specific attribute**
  - Use the @ sign followed by the attribute name to select a particular node

```
<xsl:template match="order[@discount]" >
   <!-- Match all order elements that have a     -->
   <!-- discount attribute.                      -->
</xsl:template>
```

```
<xsl:template match="catalog/item[@id='3145']" >
  <!-- Match all item elements that are a child  -->
  <!-- of catalog and have an id attribute with  -->
  <!-- a value of 3145.                          -->
</xsl:template>
```


XSLT Stylesheet Elements

- **Matching and selection templates**
  - xsl:template
  - xsl:apply-templates
  - xsl:value-of
- **Branching elements**
  - xsl:for-each
  - xsl:if
  - xsl:choose

XSLT template Element

- **`xsl:template match="`*`xpath`*`"`**
  - Defines a template rule for producing output
  - Applied only to nodes which match the pattern
  - Invoked by using <xsl:apply-templates>

```
<xsl:template match="/">
  <html>
    <head><title>Ktee Siamese</title></head>
  <body>
    <xsl:apply-templates/>
  </body>
  </html>
</xsl:template>

<xsl:template match="name">
  <h2><xsl:value-of select="."/></h2>
</xsl:template>
```


XSLT apply-templates Element

- **`xsl:apply-templates`**
  - Applies matching templates to the children of the context node

```
<xsl:template match="/">
  <html>
    <head><title>Ktee Siamese</title></head>
  <body>
    <xsl:apply-templates />
  </body>
  </html>
</xsl:template>

<xsl:template match="name">
  <h2><xsl:value-of select="."/></h2>
</xsl:template>
```

XSLT value-of Element

- **`xsl:value-of select="`*`expression`*`"`**
  - Evaluates the expression as a string and sends the result to the output
  - Applied only to the first match
  - `"."` selects the text value of the current node

```
<xsl:template match="name">
  <!-- Select text of name node.   -->
  <h2><xsl:value-of select="." /></h2>
</xsl:template>
```


XSLT value-of Element (continued)

- **Example**

```
<xsl:template match="daylily">
  <TR>
        <!-- Selects the award child of the
             daylily element. By default, outputs
             the text of the award element.       -->
    <TD><xsl:value-of select="award" /></TD>

        <!-- Selects the code attribute of the
             daylily's bloom child and outputs
             the text of the attribute.           -->
    <TD><xsl:value-of select="bloom/@code" /></TD>
  </TR>
</xsl:template>
```

XSLT for-each Element

- **`xsl:for-each select="`*`expression`*`"`**
  - Processes each node selected by the XPath expression

```
<book>
  <author>Larry Brown</author>
  <author>Marty Hall</author>
</book>
```

```
<xsl:template match="book">
  <!-- Selects each author name.   -->
  <xsl:for-each select="author">
    <b><xsl:value-of select="." /></b>
  </xsl:for-each>
</xsl:template>
```


XSLT if Element

- **`xsl:if test="expression"`**
  - Evaluates the expression to a boolean and if true, applies the template body
  - XSLT has no `if-else` construct (use `choose`)

```
<xsl:template match="ROW">
  <!-- Selects first node in the node set.   -->
  <xsl:if test="position() = first()">
    <b><xsl:value-of select="." />
  </xsl:if>
</xsl:template>

<xsl:template match="ROW">
  <!-- Select if the current node has children. -->
  <xsl:if test="node()">
    <xsl:apply-templates />
  </xsl:if>
</xsl:template>
```

XSLT choose Element

- **`xsl:choose`**
  - Select any number of alternatives
  - Instruction to use in place of `if-else` or `switch` construct found in other programming languages

```
<xsl:choose>
  <xsl:when test="not(text())">
     Missing value!
  </xsl:when>
  <xsl:otherwise>
    <xsl:value-of select="." />
  </xsl:otherwise>
</xsl:choose>
```


XSLT output Element

- **`xsl:output`**
  - Controls the format of the stylesheet output
  - Useful attributes:

```
method= "[html|xml|text]"
indent="[yes|no]"
version="version"
doctype-public="specification"
encoding="encoding"
standalone="[yes|no]"
```

- Example

```
<xsl:output method="html"
     doctype-public="-//W3C//DTD HTML 4.0 Transitional//EN"/>
```

Steps for Translating a Document

1. Tell the system which parser to use
2. Establish a factory in which to create transformations
3. Create a transformer for a particular style sheet
4. Invoke the transformer to process the document

Step 1: Specifying a Transformer

1. Approaches to specify a transformer
   - Set a system property for `javax.xml.transform.TransformerFactory`
   - Specify the parser in `jre_dir/lib/jaxp.properties`
   - Through the J2EE Services API and the class specified in `META-INF/services/javax.xml.transform.TransformerFactory`
   - Use system-dependant default parser (check documentation)

Specifying a Transformer, Example

- **The following example:**
  - Permits the user to specify the transformer through the command line `-D` option

```
java -Djavax.xml.transform.TransformerFactory=
  weblogic.apache.xalan.processor.TransformerFactoryImpl ...
```

  - Uses the Apache Xalan transformer otherwise

```
public static void main(String[] args) {
  String jaxpPropertyName =
    "javax.xml.transform.TransformerFactory ";
  if (System.getProperty(jaxpPropertyName) == null) {
    String apacheXercesPropertyValue =
      "org.apache.xalan.xsltc.trax.TransformerFactoryImpl";
    System.setProperty(jaxpPropertyName,
                       apacheXercesPropertyValue);
  }
  ...
}
```


Step 2: Creating a Transformer Factory

- **Establish a factory in which to create transformations**

```
TransformerFactory factory =
    new TransformerFactory.newInstance();
```

  - May create multiple transformers from the same factory

Step 3: Creating a Transformer

- **Create a transformer for a particular style sheet**

```
Source xsl = new StreamSource(xslStream);
Templates template = factory.newTemplates(xsl);
Transformer transformer =
                template.newTransformer();
```


Step 4: Invoke the Transformer

- **Invoke the transformer to process the document**

```
Source xml = new StreamSource(xmlStream);
Result result = new StreamResult(outputStream);
transformer.transform(xml, result);
```

  - Create a `StreamSource` from a `File`, `Reader`, `InputStream` or URI reference (`String`)
  - Create a `StreamResult` from a `File`, `Writer`, `OutputStream` or URI reference (`String`)

A Simple XSL Transformer

- **Creates an XSL transformer for processing an XML and XSL document**
  - Provides multiple overloaded `process` methods for handling different input and output streams

```
public class XslTransformer {
  private TransformerFactory factory;

  // Use system defaults for transformer.
  public XslTransformer() {
    factory =  TransformerFactory.newInstance();
  }
  ...
```


A Simple XSL Transformer

```
/**  For transforming an XML documents as a String StringReader
  *  residing in memory, not on disk. The output document could
  *  easily be  handled as a String (StringWriter) or as a
  *  JSPWriter in a JavaServer page.
  */
 public void process(Reader xmlFile, Reader xslFile,
                     Writer output)
                throws TransformerException {
   process(new StreamSource(xmlFile),
           new StreamSource(xslFile),
           new StreamResult(output));
 }

/**  For transforming an XML and XSL document as Files,
  *  placing the result in a Writer.
  */
 public void process(File xmlFile, File xslFile,
                     Writer output)
                throws TransformerException {
   process(new StreamSource(xmlFile),
           new StreamSource(xslFile),
           new StreamResult(output));
 }
```

Simple XSL Transformer (continued)

```
/**  Transform an XML File based on an XSL File, placing the
  *  resulting transformed document in an OutputStream.
  *  Convenient for handling the result as a FileOutputStream or
  *  ByteArrayOutputStream.
  */
public void process(Source xml, Source xsl, Result result)
                throws TransformerException {
   try {
     Templates template = factory.newTemplates(xsl);
     Transformer transformer = template.newTransformer();
     transformer.transform(xml, result);
   } catch(TransformerConfigurationException tce) {
       throw new TransformerException(tce.getMessageAndLocation());
   } catch (TransformerException te) {
     throw new TransformerException(te.getMessageAndLocation());
   }
  }
}
```


Example 1: XSLT Document Editor

- **Objective**
  - Provide a graphical interface for editing XML and XSL documents, and to view the transformed result
- **Approach**
  - Use a Swing `JTabbedPane` with three tabs (XML, XSL, XSLT) to present each of the three corresponding documents
  - Each document is represented by a `JEditorPane`
    - XML and XSL panes are editable
  - Selecting the XSLT tab performs the transformation

Example 1: XsltEditor

```
import java.awt.*;
import java.awt.event.*;
import javax.swing.*;
import javax.swing.event.*;
import java.io.*;
import javax.xml.transform.*;
import cwp.XslTransformer;

public class XsltEditor extends JFrame
                        implements ChangeListener {
  private static final int XML  = 0;
  private static final int XSL  = 1;
  private static final int XSLT = 2;
  private Action openAction, saveAction, exitAction;
  private JTabbedPane tabbedPane;
  private DocumentPane[] documents;
  private XslTransformer transformer;
  ...
```


Example 1: XsltEditor (continued)

```
...
/** Checks to see which tabbed pane was selected by the
  *  user. If the XML and XSL panes hold a document, then
  *  selecting the XSLT tab will perform the transformation.
  */
 public void stateChanged(ChangeEvent event) {
   int index = tabbedPane.getSelectedIndex();
   switch (index) {
     case XSLT: if (documents[XML].isLoaded() &&
                    documents[XSL].isLoaded()) {
                  doTransform();
                }
     case XML:
     case XSL:  updateMenuAndTitle(index);
                break;
     default:
   }
 }
```

Example 1: XsltEditor (continued)

```
  ...
  private void doTransform() {
    StringWriter strWriter = new StringWriter();
    try {
      Reader xmlInput =
        new StringReader(documents[XML].getText());
      Reader xslInput =
        new StringReader(documents[XSL].getText());
      transformer.process(xmlInput, xslInput, strWriter);
    } catch(TransformerException te) {
      JOptionPane.showMessageDialog(this,
                    "Error: " + te.getMessage());
    }
    documents[XSLT].setText(strWriter.toString());
  }
  ...
}
```


Example 1: DocumentPane

```
public class DocumentPane extends JEditorPane {
  public static final String TEXT = "text/plain";
  public static final String HTML = "text/html";
  private boolean loaded = false;
  private String filename = "";

  /** Set the current page displayed in the editor pane,
   *  replacing the existing document.
   */
  public void setPage(URL url) {
    loaded = false;
    try {
      super.setPage(url);
      File file = new File(getPage().toString());
      setFilename(file.getName());
      loaded = true;
    } catch (IOException ioe) {
      System.err.println("Unable to set page: " + url);
    }
  }
```

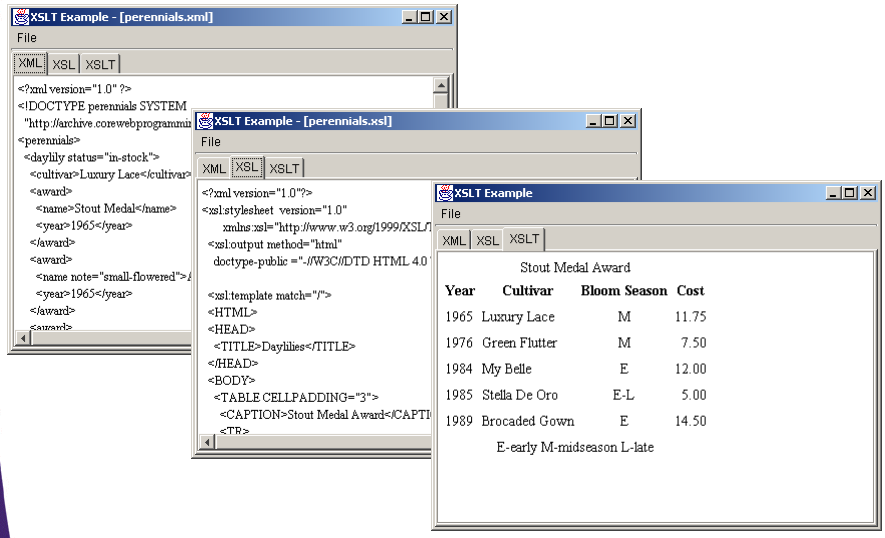
Example 1: DocumentPane (continued)

```
  public void setText(String text) {
    super.setText(text);
    setFilename("");
    loaded = true;
  }

  public void loadFile(String filename) {
    try {
      File file = new File(filename);
      setPage(file.toURL());
    } catch (IOException mue) {
      System.err.println("Unable to load file: " + filename);
    }
  }

  public boolean isLoaded() {
    return(loaded);
  }
  ...
}
```


Example 1: XsltEditor, Result



Example 2: XSLT Custom Tag

- **Objective**
  - Develop a JSP custom tag to transform an XML document and create an HTML table
- **Problem**
  - THEAD, TBODY, and TFOOT elements supported by Internet Explorer, but not by Netscape 4.x

Example 2: XSLT Custom Tag (continued)

- **Approach**
  - Use different stylesheet for Internet Explorer and Netscape
  - Determine the browser type based on the `User-Agent` HTTP header
  - Provide both stylesheets in custom tag

```
<cwp:xsltransform xml='perennials.xml'
                  xslie='perennials-ie.xsl'
                  xslns='perennials-ns.xsl' />
```

Example 2: Custom Tag Specification, Xsltransform.tld

```
...
<tag>
  <name>xsltransform</name>
  <tagclass>cwp.tags.XslTransformTag</tagclass>
    <attribute>
    <name>xml</name>
    <required>yes</required>
  </attribute>
  <attribute>
    <name>xslie</name>
    <required>false</required>
  </attribute>
  <attribute>
    <name>xslns</name>
    <required>true</required>
  </attribute>
</tag>
```


Example 2: XslTransformTag

```
public class XslTransformTag extends TagSupport {
  private static final int IE = 1;
  private static final int NS = 2;

  public int doStartTag() throws JspException {
    ServletContext context = pageContext.getServletContext();
    HttpServletRequest request =
      (HttpServletRequest)pageContext.getRequest();

    File xslFile = null;
    if ((browserType(request) == IE) &&
        (getXslie() != null)) {
      xslFile = new File(path + getXslie());
    } else {
      xslFile = new File(path + getXslns());
    }
    File xmlFile = new File(path + getXml());
    ...
```

Example 2: XslTransformTag (continued)

```
    // doStartTag
    try {
      JspWriter out = pageContext.getOut();
      XslTransformer transformer = new XslTransformer();
      transformer.process(xmlFile, xslFile, out);
    }
    catch(TransformerException tx) {
      context.log("XslTransformTag: " + tx.getMessage());
    }
    return(SKIP_BODY);
  }
  ...
```


Example 2: XslTransformTag (continued)

```
  // Determine the browser type based on the User-Agent
  // HTTP request header.

  private int browserType(HttpServletRequest request) {
    int type = NS;
    String userAgent = request.getHeader("User-Agent");
    if ((userAgent != null) &&
        (userAgent.indexOf("IE") >= 0)) {
      type = IE;
    }
    return(type);
  }
}
```

Example 2: Daylilies.jsp

```
<HTML>
<HEAD>
  <TITLE>Daylilies</TITLE>
</HEAD>
<BODY>
<%@ taglib uri="cwp-tags/xsltransform.tld" prefix="cwp" %>

<H1 ALIGN="CENTER">Katie's Favorite Daylilies</H1>
<P>
<cwp:xsltransform xml='perennials.xml'
                  xslie='perennials-ie.xsl'
                  xslns='perennials-ns.xsl' />

</BODY>
</HTML>
```

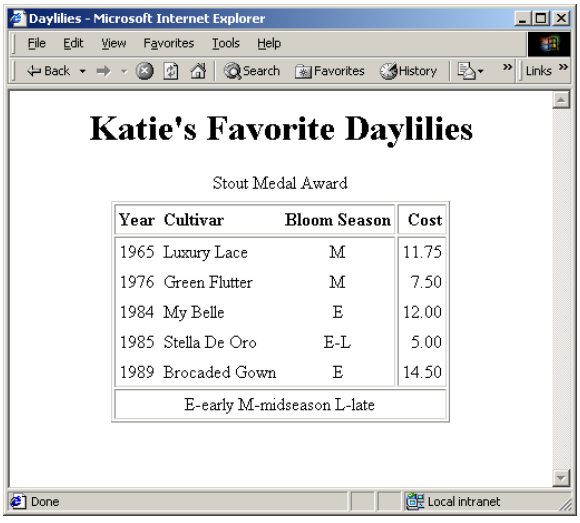

Example 2: perennials-ie.xsl

```
 <xsl:template match="/">
  <TABLE CELLPADDING="3" RULES="GROUPS" ALIGN="CENTER">
    <CAPTION>Stout Medal Award</CAPTION>
    <COLGROUP>
      <COL ALIGN="CENTER"/>
      <COL ALIGN="LEFT"/>
      <COL ALIGN="CENTER"/>
      <COL ALIGN="RIGHT"/>
    </COLGROUP>
    <THEAD>
      <TR><TH>Year</TH><TH>Cultivar</TH><TH>Bloom Season</TH>
          <TH>Cost</TH></TR>
    </THEAD>
    <TBODY>
      <xsl:apply-templates
        select="/perennials/daylily[award/name='Stout Medal']"/>
    </TBODY>
    <TFOOT>
      <TR><TD COLSPAN="4">E-early M-midseason L-late</TD></TR>
    </TFOOT>
  </TABLE>
</xsl:template>
```

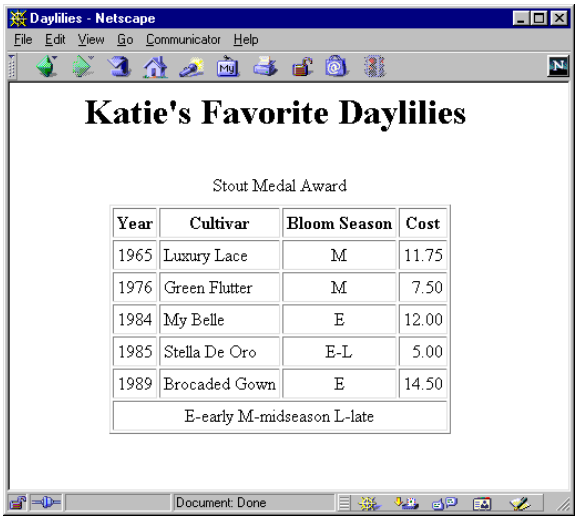
Example 2: perennials-ns.xsl

```
<xsl:template match="/">
  <TABLE CELLPADDING="3" BORDER="1" ALIGN="CENTER">
    <CAPTION>Stout Medal Award</CAPTION>
    <TR>
      <TH>Year</TH>
      <TH>Cultivar</TH>
      <TH>Bloom Season</TH>
      <TH>Cost</TH>
    </TR>
    <xsl:apply-templates
      select="/perennials/daylily[award/name='Stout Medal']"/>
    <TR>
      <TD COLSPAN="4" ALIGN="CENTER">
        E-early M-midseason L-late</TD>
    </TR>
  </TABLE>
</xsl:template>
```


XSLT Custom Tag, Result



XSLT Custom Tag, Result



Summary

- **XSLT specifies how to transform XML into HTML, XML, or other document formats**
- **XPath pattern selects a set of nodes for processing**
- **Control conditional processing through XSLT templates (elements)**
- **Apache Xalan-J in a popular XLST compliant transformer**
  - `InputSource` document is typically a `File` or `String` (`StringReader`)
  - `Result` document typically sent to a `File` or `JspWriter` in a servlet

core WEB programming

Questions?