Session 19

Introduction to Server-Side Scripting

1

Lecture Objectives

- Recognize that a server script provides a way to extend an html page to include logic and insertion of data
- Understand the operation of a template engine
- Understand how a template engine can translate a JSP into a servlet

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2

Server Side Scripting

- Server side scripting - running scripts server-side to produce dynamic web page content before the page is sent to the user's web browser
- A template engine processes a scripted template to produce content that can be sent to the browser
- Examples
  - JSP
  - ThymeLeaf
  - PHP
  - NodeJS
  - JSF

One goal of server side scripting is to separate the view from data and business logic

In CSE336, we don't consider server side scripting languages not covered in the CS base programming sequence

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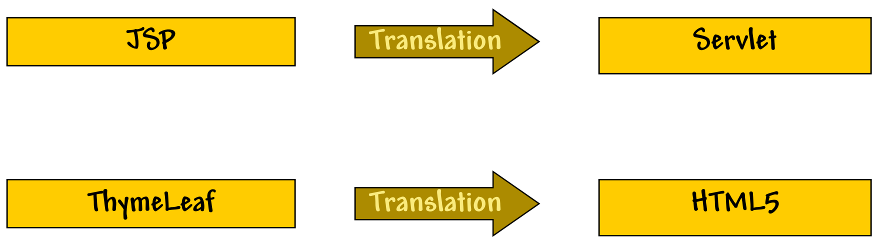
Translation Approaches

- Examples



Translation to HTML5 allows the template to be designed using html design tools

JSP capabilities are a subset of those of ThymeLeaf

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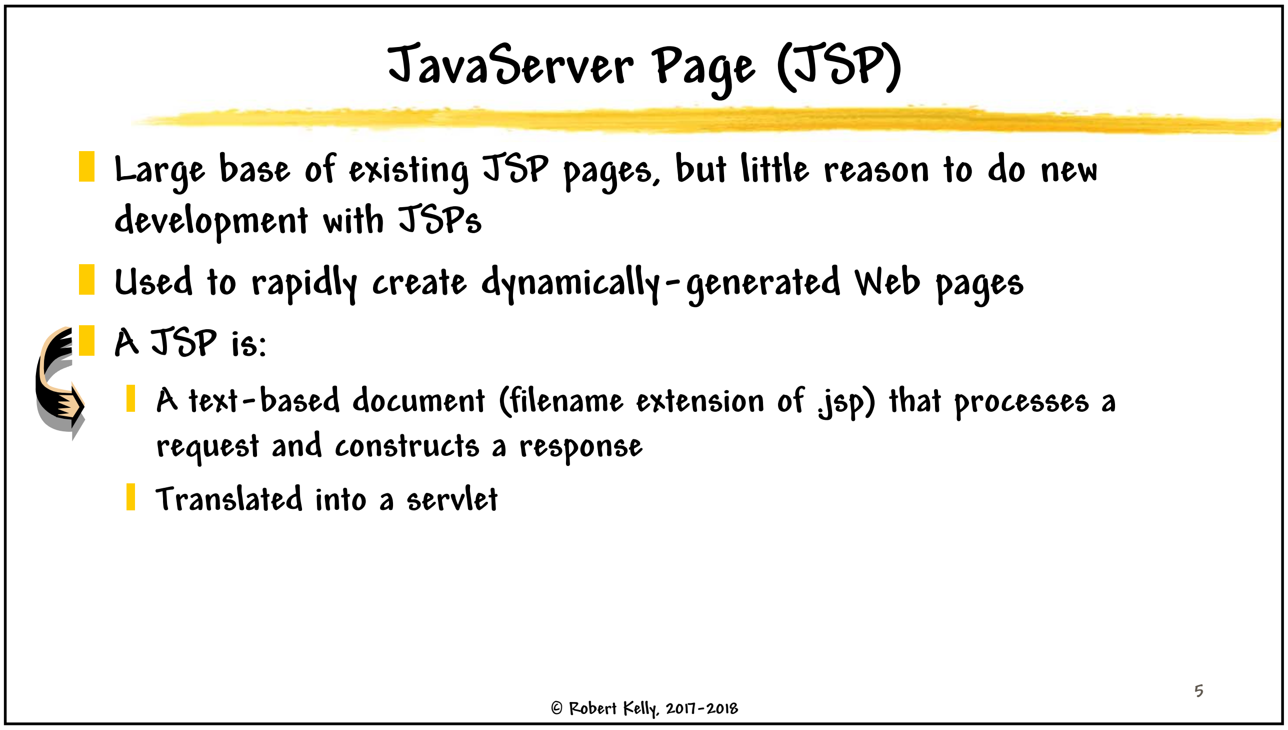

JavaServer Page (JSP)

- Large base of existing JSP pages, but little reason to do new development with JSPs
- Used to rapidly create dynamically-generated Web pages
- A JSP is:
  - A text-based document (filename extension of .jsp) that processes a request and constructs a response
  - Translated into a servlet

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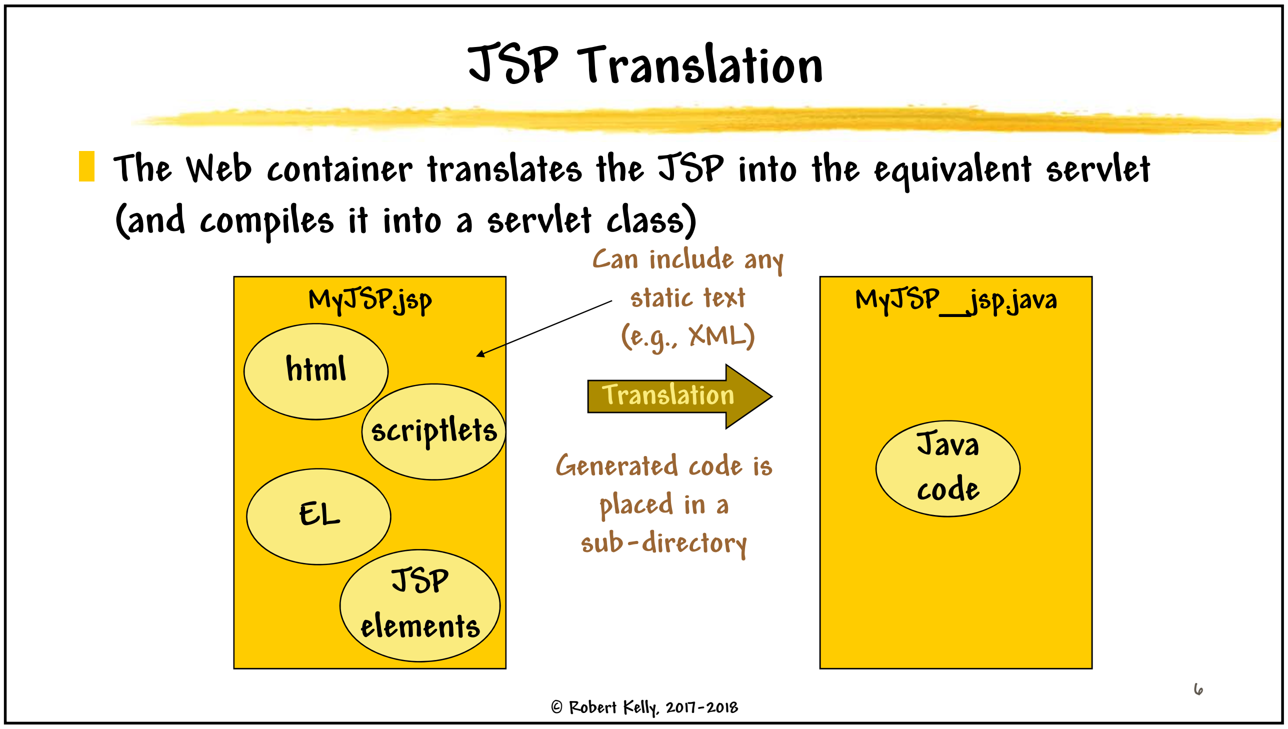
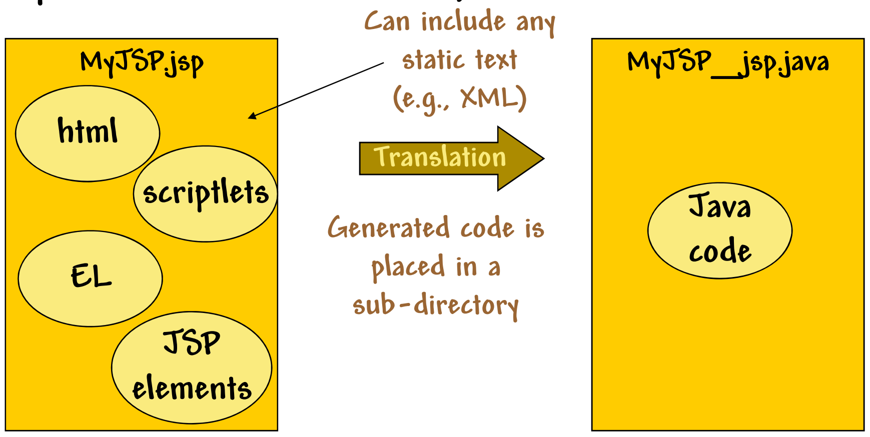


JSP Translation

- The Web container translates the JSP into the equivalent servlet (and compiles it into a servlet class)


MyJSP.jsp
html
scriptlets
EL
JSP elements
Can include any static text (e.g., XML)
Translation
Generated code is placed in a sub-directory
MyJSP__jsp.java
Java code

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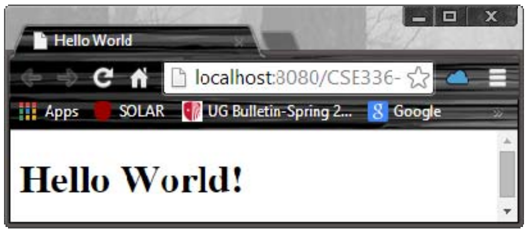
HelloWorld.jsp

```
<%@page contentType="text/html" pageEncoding="UTF-8" %>
<!DOCTYPE html>
<html>
  <head>
     <title>Hello World</title>
  </head>
  <body>
     <h1>Hello World!</h1>
  </body>
</html>
```

Doesn't this look like an html file?



Hello World!

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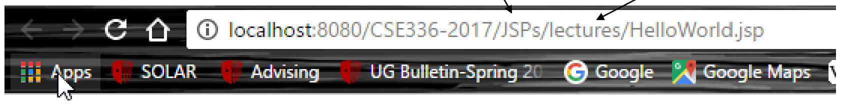
7

HelloWorld.jsp Generates a Web Page

```
<%@page contentType="text/html"  pageEncoding="UTF-
8"%>
<!DOCTYPE html>
<html><head>
<title>Hello World</title>
    </head>
    <body>
        <h1>Hello World!</h1>
    </body>
</html>
```

Notice the URL

You can place the JSPs in the root or in any sub-directory (e.g., JSPs)



localhost:8080/CSE336-2017/JSPs/lectures/HelloWorld.jsp

Hello World!

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8

Generated HelloWorld Servlet …

```
private static final JspFactory _jspxFactory =
JspFactory.getDefaultFactory();
  private static java.util.List<String> _jspx_dependants;
  private org.glassfish.jsp.api.ResourceInjector
_jspx_resourceInjector;
  public java.util.List<String> getDependants() {
    return _jspx_dependants;
  }
```

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9

… Generated HelloWorld Servlet …

```
public void _jspService(HttpServletRequest request,
HttpServletResponse response)
        throws java.io.IOException, ServletException {
    PageContext pageContext = null;
    HttpSession session = null;
    ServletContext application = null;
    ServletConfig config = null;
    JspWriter out = null;
    Object page = this;
    JspWriter _jspx_out = null;
    PageContext _jspx_page_context = null;
```

Note the predefined JSP variables

When you use the identifier "session", it refers to this variable in the generated servlet

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10

… Generated HelloWorld Servlet …

```
try {
      response.setContentType("text/html;charset=UTF-8");
      pageContext = _jspxFactory.getPageContext(this, request,
response, null, true, 8192, true);
      _jspx_page_context = pageContext;
      application = pageContext.getServletContext();
      config = pageContext.getServletConfig();
      session = pageContext.getSession();
      out = pageContext.getOut();
      _jspx_out = out;
      _jspx_resourceInjector =
(org.glassfish.jsp.api.ResourceInjector)
application.getAttribute("com.sun.appserv.jsp.resource.injector");
```

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11

… Generated HelloWorld Servlet …

```
      out.write("\n");
      out.write("<!DOCTYPE html>\n");
      out.write("<html>\n");
      out.write("    <head>\n");
      out.write("        <title>Hello World</title>\n");
      out.write("    </head>\n");
      out.write("    <body>\n");
      out.write("        <h1>Hello World!</h1>\n");
      out.write("    </body>\n");
      out.write("</html>\n");
    }
```

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12

… Generated HelloWorld Servlet

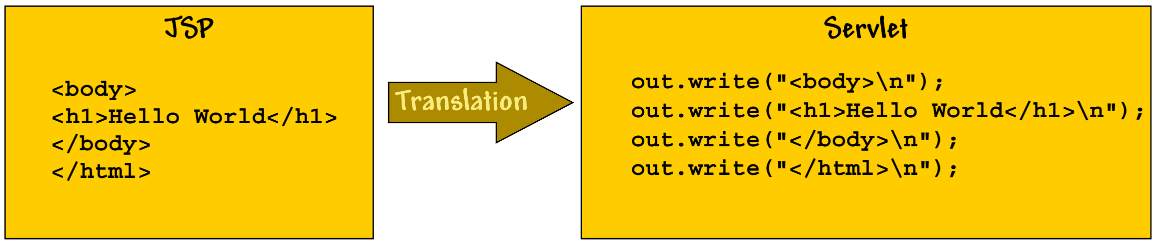
```
catch (Throwable t) {
      if (!(t instanceof SkipPageException)){
        out = _jspx_out;
        if (out != null && out.getBufferSize() != 0)
          out.clearBuffer();
        if (_jspx_page_context != null)
_jspx_page_context.handlePageException(t);
        else throw new ServletException(t);
      }
    } finally {
      _jspxFactory.releasePageContext(_jspx_page_context);
    }
  }
}
```

Note: Web container is sometimes referred to as servlet/JSP container

JSP Translation

- The translation engine will translate your static text (e.g., html) into the corresponding servlet statements

"\r\n" in Java is equivalent to <br />



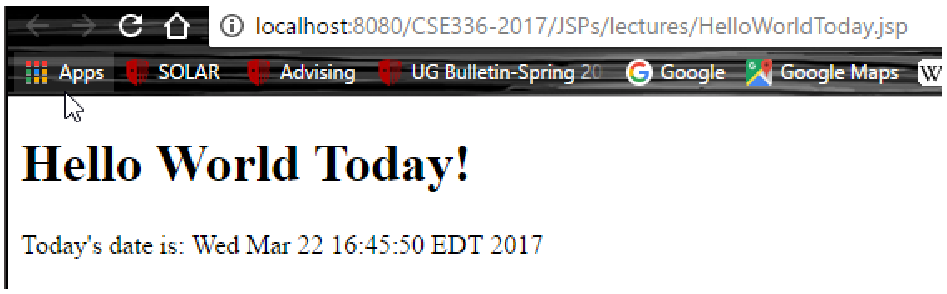
```
<body>
<h1>Hello World</h1>
</body>
</html>
```

```
out.write("<body>\n");
out.write("<h1>Hello World</h1>\n");
out.write("</body>\n");
out.write("</html>\n");
```

- You can insert code (Java, EL, etc.) into your JSP - it is directly translated into the corresponding part of your servlet

Example - HelloWorldToday

- The JSP will display today's date


localhost:8080/CSE336-2017/JSPs/lectures/HelloWorldToday.jsp
Apps
SOLAR
Advising
UG Bulletin-Spring 20
Google
Google Maps

Hello World Today!

Today's date is: Wed Mar 22 16:45:50 EDT 2017

HelloWorldToday.jsp

```
...
<html>
  <head>
      <title>Hello World Today</title>
  </head>
  <body>
      <h1>Hello World Today!</h1>
      <p>Today's date is:
      <%= new java.util.Date() %>
      </p>
  </body>
</html>
```

Note the syntax of the JSP expression
`<%=   ...   %>`

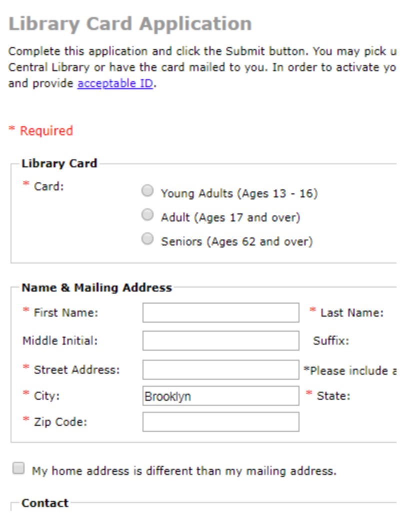
This JSP expression translates to
`out.print( new java.util.Date());`
the translated statement is placed into the newly created servlet

This style of inserting code into your template is not effective

Are We on Track?

No points for early finishers

- Part 1 (Create a new jsp from an html file)
  - Copy your project html
  - Create a new jsp in your IDE
  - Drop the html into your JSP source
- Run



Library Card Application

Complete this application and click the Submit button. You may pick u
Central Library or have the card mailed to you. In order to activate yo
and provide acceptable ID.

* Required

Library Card

* Card: ○ Young Adults (Ages 13 - 16) ○ Adult (Ages 17 and over) ○ Seniors (Ages 62 and over)

Name & Mailing Address

* First Name:		* Last Name:	
Middle Initial:		Suffix:	
* Street Address:		*Please include a	
* City:	Brooklyn	* State:	
* Zip Code:			

☐ My home address is different than my mailing address.

Contact

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17

Overview - JSP Page Contents

- HTML (or XML or ...)
- JSP constructs
  - Directives – control the overall structure of the servlet (page, include, and taglib directives)
  - Scripting elements
    - Expressions – inserted into servlet output
      `<%= expression %>`
    - Scriptlets – inserted into servlet code
      `<% code %>`
    - Declarations – inserted into body of servlet class
      `<%! code %>`
  - Actions – control behavior of the JSP engine

You can think of a JSP as an HTML page with escapes to insert dynamic data

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18

Scripting Elements

- JSP tags that allow code to be embedded in a JSP page
- The code contained in these JSP scripting elements is inserted into the corresponding location of the JSP servlet
- JSP scripting elements include the following:
  - Expressions – single line of code
  - Scriptlets – blocks of code
  - Declarations – class level declarations (e.g., new instance variables/methods)
- Not considered to be a good programming practice – use servlets, beans, and custom tags for data and control
- Use of Expression Language (EL) is much better JSP practice – we cover this in the next session

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JSP Scriptlets

- You can insert arbitrary code into the JSP
- Form: <% Java Code %>
- Scriptlets are sometimes used as a crude way to:
  - Set Http response headers and status codes
  - Update a database
  - Provide conditional code and loop

Scriptlets might be included in a CSE336 exam to demonstrate an understanding of JSP operation

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Predefined Variables

- Also referred to as implicit objects, and includes
  - request - HttpRequest object
  - response - HttpResponse object
  - out - PrintWriter object
  - session - note that sessions are created automatically
  - application - the ServletContext object that can be used to store persistent data (using setAttribute and getAttribute methods)
  - config - servletConfig object
  - pageContext
  - page - not typically used by JSP authors

Be careful with the name inconsistency

What Does the Container Do With Your JSP?

- Looks at directives to determine if anything should be done at translation
- Creates an HttpServlet subclass
- Writes import statements into the servlet (if there is a page directive with an import attribute)
- Writes JSP declaration code
- Builds the service method
- Merges HTML, scriptlets, and expressions into the service method

JSP Summary

- JSPs are text-based documents that contain
  - Static template data (e.g., html, xml)
  - JSP elements (for constructing dynamic content) denoted by <% ... %>
- JSPs access dynamic data through objects that
  - Are provided with the environment (e.g., Session object)
  - You create (e.g., Java bean)
- JSPs can employ an alternate XML-based JSP syntax
- JSPs encapsulate the design view of a page (separate from code for dynamic actions, often contained in java beans and custom tags

Have You Satisfied the Lecture Objectives

- Recognize that a server script provides a way to extend an html page to include logic and insertion of data
- Understand the operation of a template engine
- Understand how a template engine can translate a JSP into a servlet