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Web ontwikkeling 2

Les 6: No Scriptlets

Slide 2

AGENDA

- Expression language
- JSP actions

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EXAM QUESTIONS...

- What is the advantage of using expression language instead of JSP scriptlets and JSP expressions
- What is the difference between the . operator and the [ ]
- What does JSTL stand for?
- Name the 6 language constructs of JSP
- Is JSTL used in the View, Model or Controller?
- When is a Java class a JavaBean?
- …

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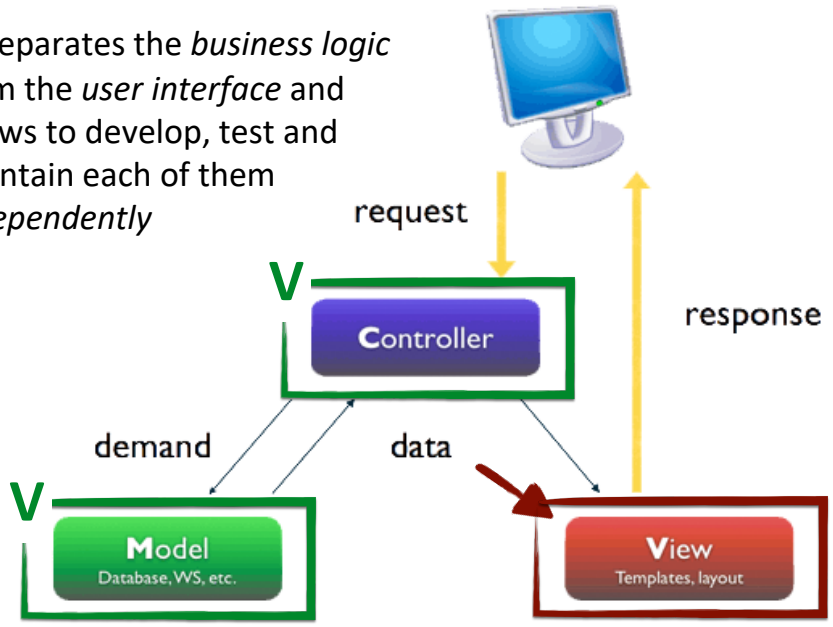
MVC

... separates the *business logic* from the *user interface* and allows to develop, test and maintain each of them *independently*



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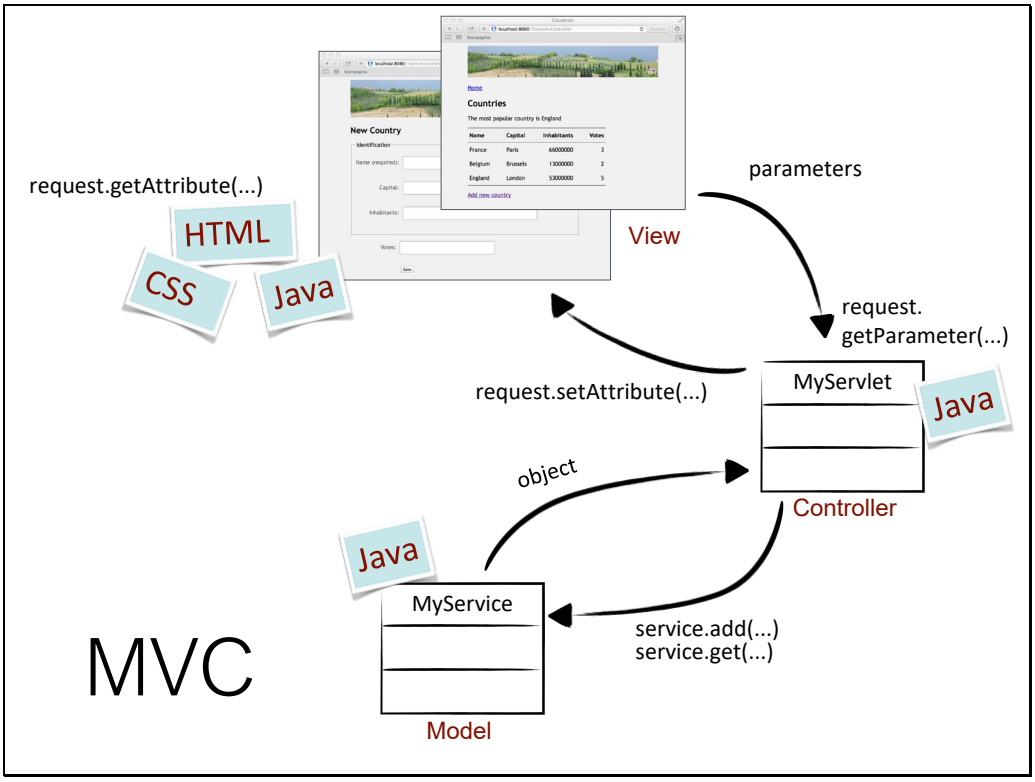

Recap workflow:

- parameters can be passed with HTTP request
- servlet reads them with request.getParameter()
- model is called to add or get an object
- model can return object(s)
- objects can be passed to view with request.setAttribute()
- objects can be read with request.getAttribute()

Technologies used:

- controller: Java
- model: Java
- view: Java, css, html

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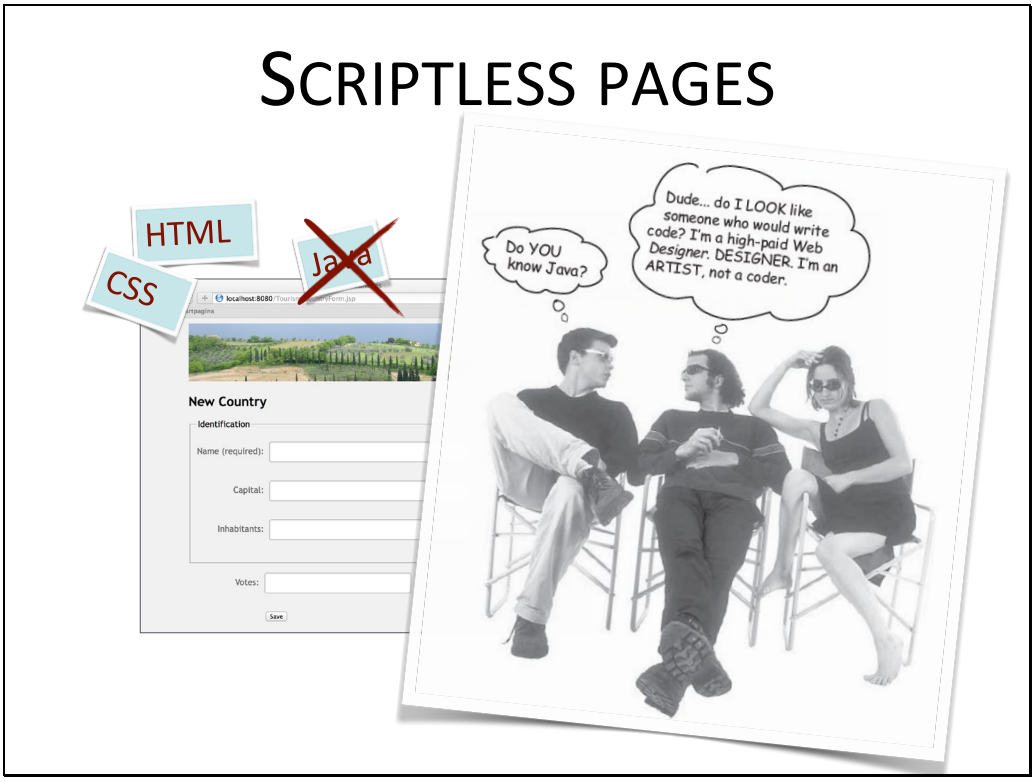

Problem:

- designers should be able to create view
- good designers or not necessarily good programmers (and vice versa)

Solution: avoid Java in view

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JSP 2.0: EXPRESSION LANGUAGE

```
<td>
  <%= ((Dier) request.getAttribute("dier")).getNaam()%>
</td>
```

no cast!

```
<td>
   ${dier.naam}
</td>
```

property

JSP knows:
this must be an attribute

PUBLIC ???

JSP scriplets and expressions are replaced by expression language
Easier:

- JSP assumes you are asking for an attribute —> no request.getAttribute()
- JSP can find out what type you're talking about —> no cast
- JSP expects a property after the dot —> no get-method

Does this mean we should make our properties public?

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JAVABEAN

```
public class Dier {
    private String naam;

    public Dier() {
    }

    public String getNaam() {
        return naam;
    }

    public void setNaam(String naam) {
        this.naam = naam;
    }
}
```

public no-arg constructor

getter and setter
define a property

No, as long as we use the JavaBean conventions:

- getters an setters define a property (public getter to be able to read the property, public setter to modify it)
- a default constructor should be present (no arguments)

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. OPERATOR

- Syntax:

```
${attribute.property}
${attribute.property.propertyOfProperty}
```

- Only for **Javabean** or **Map**

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EXAMPLES . OPERATOR

```
private Country country = new Country("Belgium", "Brussels", 13000000, 5); ...
```

${country.votes}

```
private Address address = new Address("Herestraat", 49, "Leuven";
private Person customer = new Person("Bert", address; ...
```

${customer.address.street}

```
private Map<String, Country> countries = new HashMap<String, Country>();...
countries.put(country.getName(), country);
```

${countries.Belgium.capital}

```
private List<Country> countries = new ArrayList<Country>(); countries.add(country.getName(), country);
```

→ not possible

[ ] OPERATOR

- Syntax:

```
${attribute["property"]}
${attribute[0]}
```

- For **Javabean, Map, Array, List, …**

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EXAMPLES [ ] OPERATOR

```
private Country country = new Country("Belgium", "Brussels", 13000000, 5); ...
```

```
${country["votes"]}
```

```
private Address address = new Address("Herestraat", 49, "Leuven";
private Person customer = new Person("Bert", address; ...
```

```
${customer["address"]["street"]}
```

```
private Map<String, Country> countries = new HashMap<String, Country>();...
countries.put(country.getName(), country);
```

```
${countries["Belgium"]["capital"]}
```

```
private List<Country> countries = new ArrayList<Country>();
countries.add(country.getName(), country);
```

```
${countries[0]}
```

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WHAT IF …

I want to show a parameter and not an attribute ?

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READ PARAMETER

http://localhost:8080/Servlet?naam=Albert

```
<td>
   ${param.naam}
</td>
```

parameter name

JSP knows:
this is probably not an attribute
I should look for a parameter

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WHAT IF …

I want to be sure my project does not contain scriptlets ?

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DISABLE SCRIPTLETS

```
<?xml version="1.0" encoding="UTF-8"?>
<web-app version="2.5" xmlns="http://java.sun.com/xml/ns/javaee"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://java.sun.com/xml/ns/javaee http://
                                    java.sun.com/xml/ns/javaee/web-app_2_5.xsd">

    <jsp-config>
        <jsp-property-group>
            <url-pattern>*.jsp</url-pattern>
            <scripting-invalid>true</scripting-invalid>
        </jsp-property-group>
    </jsp-config>

    <welcome-file-list>
        <welcome-file>index.html</welcome-file>
    </welcome-file-list>
</web-app>
```

If you want to be sure that all script lets are replaced, you can disable them in your web.xml

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HTTP Status 500 - /countryForm.jsp (line: 20, column: 5) Scripting elements (<%!, <jsp:declaration, <%=, <jsp:expression, <%, <jsp:scriptlet) are disallowed here.

---

type Exception report

message /countryForm.jsp (line: 20, column: 5) Scripting elements (<%!, <jsp:declaration, <%=, <jsp:expression, <%, <jsp:scriptlet) are disallowed here.

description The server encountered an internal error that prevented it from fulfilling this request.

exception

```
org.apache.jasper.JasperException: /countryForm.jsp (line: 20, column: 5) Scripting elements (
        org.apache.jasper.compiler.DefaultErrorHandler.jspError(DefaultErrorHandler.java:42)
        org.apache.jasper.compiler.ErrorDispatcher.dispatch(ErrorDispatcher.java:443)
        org.apache.jasper.compiler.ErrorDispatcher.jspError(ErrorDispatcher.java:89)
        org.apache.jasper.compiler.Validator$ValidateVisitor.visit(Validator.java:721)
        org.apache.jasper.compiler.Node$Scriptlet.accept(Node.java:932)
        org.apache.jasper.compiler.Node$Nodes.visit(Node.java:2375)
        org.apache.jasper.compiler.Node$Visitor.visitBody(Node.java:2427)
        org.apache.jasper.compiler.Node$Visitor.visit(Node.java:2433)
        org.apache.jasper.compiler.Node$Root.accept(Node.java:474)
        org.apache.jasper.compiler.Node$Nodes.visit(Node.java:2375)
        org.apache.jasper.compiler.Validator.validateExDirectives(Validator.java:1817)
        org.apache.jasper.compiler.Compiler.generateJava(Compiler.java:217)
        org.apache.jasper.compiler.Compiler.compile(Compiler.java:373)
        org.apache.jasper.compiler.Compiler.compile(Compiler.java:353)
        org.apache.jasper.compiler.Compiler.compile(Compiler.java:340)
        org.apache.jasper.JspCompilationContext.compile(JspCompilationContext.java:657)
        org.apache.jasper.servlet.JspServletWrapper.service(JspServletWrapper.java:357)
        org.apache.jasper.servlet.JspServlet.serviceJspFile(JspServlet.java:390)
        org.apache.jasper.servlet.JspServlet.service(JspServlet.java:334)
```

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There is much more you can do with expression language.
This does not mean you have to use all these possibilities: they might lead to bad design.
Remember: your view should contain any other than presentation logic!

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REFACTOR


```
<p>Het dier met naam
<%= request.getParameter(“naam")%>
moet
<%= ((Dier) request.getAttribute("gevondenDier")).getVoedsel()%>
keer per dag eten krijgen.</p>
```

Assignment: refactor this, using expression language.

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RESULT

Het dier met naam

${param.naam}

moet

${gevondenDier.voedsel}

keer per dag eten krijgen.

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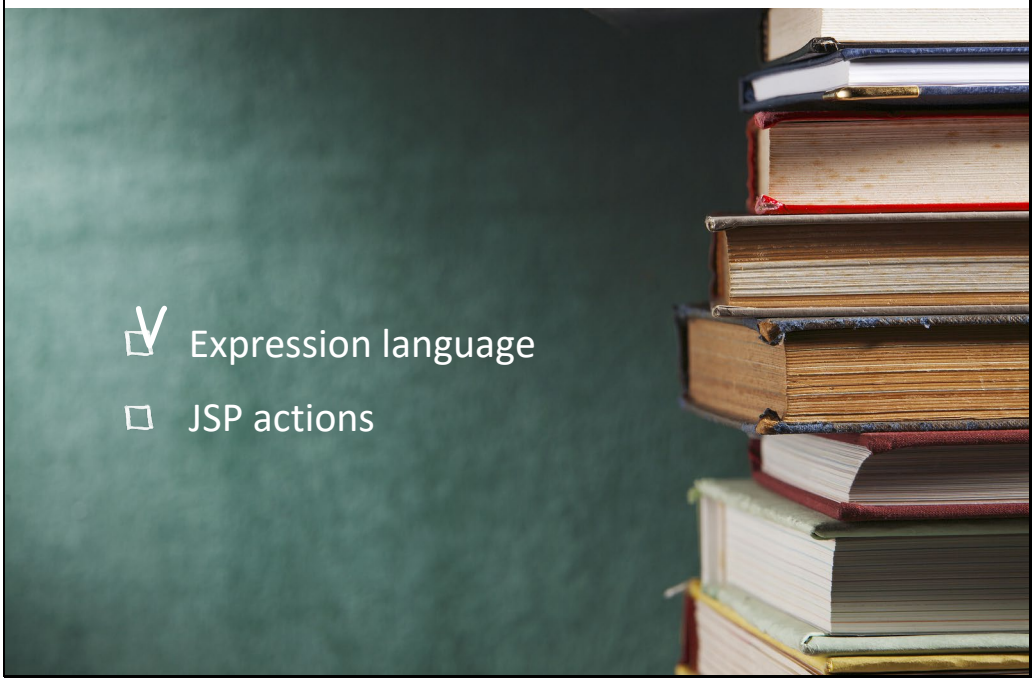
AGENDA



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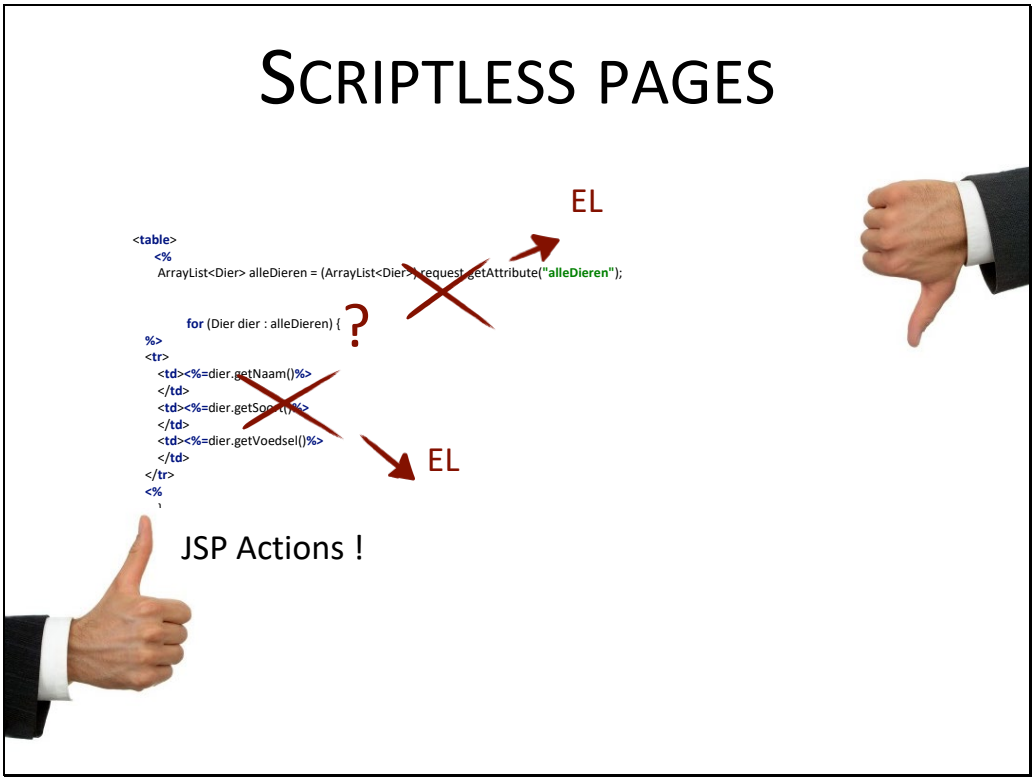

Example country overview: some parts we can refactor with expression language, but other parts we can't. Expression language is not enough. That's why there is something else called JSP Actions.

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JSP ACTIONS

- = predefined XML *tags*

components of a 'tag library'

- Categories:
  - standard `<jsp:include>`
  - custom `<c:forEach>`

    `<mine:homeMade>`

JSP actions are tags you can use next to the normal html tags. They offer you extra functionality, without using to much Java in your pages.

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STANDARD ACTIONS

STANDARD ACTIONS

- defined in JSP itself
- begin with default `jsp:` prefix

<jsp:include>	Includes the response from a servlet or JSP page during the request processing phase
<jsp:param>	Adds a parameter value to a request handed off to another servlet
<jsp:plugin>	Generates HTML that contains the appropriate browser-dependent elements (OBJECT or EMBED) needed to execute an applet with the Java Plug-in software

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STANDARD ACTIONS

```
<jsp:include page="header.jsp"/>
```

```
<jsp:include page="header.jsp">
   <jsp:param name="title"value="Countries"/>
</jsp:include>
```

```
<jsp:plugin type="applet" code="Molecule.class" codebase="/html">
  <jsp:params>
    <jsp:param name="molecule" value="molecules/benzene.mol" />
  </jsp:params>
  <jsp:fallback>
    <p>Unable to load applet</p>
  </jsp:fallback>
</jsp:plugin>
```

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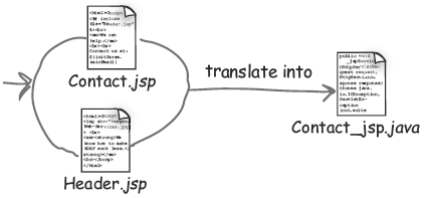
INCLUDE

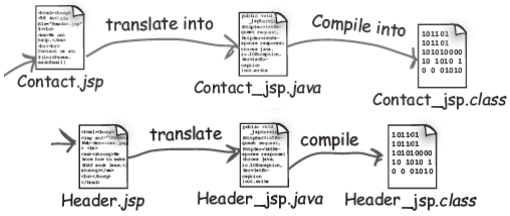
```
<%@include file="header.jsp" %>
```



inserts SOURCE
of “Header.jsp”
at translation time

```
<jsp:include page="header.jsp"/>
```

inserts RESPONSE
of “Header.jsp”
at runtime



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DRY

```
<body>
    <%@include file="header.jspf" %>

    <main id="container">
    <p>
        <a href="index.html">Home</a>
    </p>
    <h1>Countries</h1>
    <article> ...
```

```
<body>
    <%@include file="header.jspf" %>

    <main id="container">
    <p>
        <a href="index.html">Home</a>
    </p>
    <h1>New Country</h1>
    <article> ...
```

?

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DRY

```
<body>
    <%@include file="header.jspf" %>

    <main id="container">
    <jsp:include page="title.jsp">
      <jsp:param name="title" value="Countries" />
    </jsp:include>
    <article> ...
```

```
<body>
    <%@include fil

    <main id="container">
    <jsp:include page="title.jsp">
      <jsp:param name="title" value="New Country" />
    </jsp:include>
    <article> ...
```

```
<%@ page language="java" contentType="text/html; charset=UTF-8"
  pageEncoding="UTF-8"%>
<p>
    <a href="index.html">Home</a>
</p>
<h1>${param.title}</h1>
```

title.jsp

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CUSTOM ACTIONS

CUSTOM ACTIONS

- user-defined JSP language element
- NOT defined in JSP itself → include !
- Example: **JSP Standard Tag Library**

Custom actions are located in extra libraries. You will have to include them in your build path, and you will have to reference them from your JSP page.

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JSTL

- **J**SP **S**tandard **T**ag **L**ibrary
- Bundels recurring functionality:
  - iteration
  - choice
  - ...

Documentation:
https://www.javaworld.com/article/2073217/soa/jsp-standard-tag-library-eases-webpage-development.html

This documentation will be available during exam (pdf).

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ITERATION

```
<c:forEach var="dier" items="${alleDieren}">
    <tr>
        <td>${dier.naam}</td>
        ...
    </tr>
</c:forEach>
```

CHOICE: IF

```
<c:if test="${dier.voedsel > 10}">
        ...
</c:if>
```

```
<c:if test="${dier == null ||
                dier.naam == 'Albert'}">
        …
</c:if>
```

CHOICE: IF ELSE

```
<c:choose>
        <c:when test="${dier.voedsel > 20}">
                ...
        </c:when>
        <c:when test="${dier.voedsel > 50}">
                ...
        </c:when>
        <c:otherwise>
                ...
        </c:otherwise>
</c:choose>
```

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USE LIBRARIES

Add to dependencies:

jstl-1.2.jar

```
<!-- https://mvnrepository.com/artifact/javax.servlet/jstl -->
<dependency>
  <groupId>javax.servlet</groupId>
  <artifactId>jstl</artifactId>
  <version>1.2</version>
</dependency>
```

JSP page:

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

Ask IntelliJ for help

LIBRARIES

- Core: http://java.sun.com/jsp/jstl/core
- XML: http://java.sun.com/jsp/jstl/xml
- Internationalization: http://java.sun.com/jsp/jstl/fmt
- SQL: http://java.sun.com/jsp/jstl/sql
- Functions: http://java.sun.com/jsp/jstl/functions

In this course, you will be using the Core library.

Ask IntelliJ for help …

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YOUR OWN ACTIONS

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SUMMARY JSP

Scriptlet:	`<% List<Country> countries = (List)request.getAttribute("countries"); %>`
Expression:	`<%= country.getName() %>`
Directive:	`<%@ include file="header.jsp" %>`
Declaration:	`<%! int counter = 0; %>`
EL:	`${ country.name }`
Action:	`<jsp:include page="header.jsp"/>`

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REFACTOR


```
<table>
<% ArrayList<Dier> alleDieren = (ArrayList<Dier>)
request.getAttribute("alleDieren");

for (Dier dier : alleDieren) { %>
  <tr>
    <td><%=dier.getNaam()%></td>
    <td><%=dier.getSoort()%></td>
    <td><%=dier.getVoedsel()%></td>
  </tr>
  <% } %>
</table>

<p>Het meest hongerige dier is <%= ((Dier)
request.getAttribute("meestHongerige")).getNaam() %>.
</p>
```

Assignment: refactor this, using expression language and JSP actions.

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RESULT


```
<%@taglib prefix="c" uri="http://java.sun.com/jsp/jstl/core" %>
<%@ page language="java" contentType="text/html; charset=UTF-8"
      pageEncoding="UTF-8" %>
...
    <table>
      <c:forEach var="dier" items="${alleDieren}">
       <tr>
          <td>${dier.naam}
          </td>
          <td>${dier.soort}
          </td>
          <td>${dier.voedsel}
          </td>
       </tr>
       </c:forEach>
    </table>
     <p>Het meest hongerige dier is ${meestHongerige.naam}./p>
```

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AGENDA

- ☑ Expression language
- ☑ JSP actions

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DOCUMENTATIE

- https://docs.oracle.com/en/java/javase/12/docs/api/index.html
- https://docs.oracle.com/javaee/7/tutorial/jsf-el005.htm#BNAIK
- JSP Standard Tag Library eases Webpage development JavaWorld page 3.pdf
- JSP Standard Tag Library eases Webpage development JavaWorld page 1.pdf
- JSP Standard Tag Library eases Webpage development JavaWorld page 2.pdf