



Controlling Web Application Behavior

The Deployment Descriptor: web.xml

Core Servlets & JSP book: www.coreservlets.com
 More Servlets & JSP book: www.moreservlets.com
 Servlet and JSP Training Courses: courses.coreservlets.com
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Agenda

- Location and purpose of web.xml
- Custom URLs
- Initialization parameters
 - Servlets
 - JSP Pages
- Preloading pages
- Welcome pages
- Error pages

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Deployment Descriptor: Basics

- **Filename: web.xml**
- **Location: yourWebApp/WEB-INF**
 - Tomcat's `install_dir/conf/web.xml` is server-specific!
- **Read: only when server starts**
 - But many servers have "hot deploy" option
- **Basic format:**

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<DOCTYPE web-app PUBLIC
    "-//Sun Microsystems, Inc.//DTD Web Application 2.3//EN"
    "http://java.sun.com/dtd/web-app_2_3.dtd">
<web-app>
<!-- "Real" elements go here. All are optional. -->
</web-app>
```
- **Order matters**
 - Order of the elements within `web-app` is important

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Deployment Descriptors: Version 2.2 vs. 2.3

- **2.2: Works in 2.2 and 2.3**

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<DOCTYPE web-app PUBLIC
    "-//Sun Microsystems, Inc.//DTD Web Application 2.2//EN"
    "http://java.sun.com/j2ee/dtds/web-app_2_2.dtd">
<web-app>
<!-- "Real" elements go here. All are optional. -->
</web-app>
```
- **2.3: Required if you use 2.3 features**

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<DOCTYPE web-app PUBLIC
    "-//Sun Microsystems, Inc.//DTD Web Application 2.3//EN"
    "http://java.sun.com/dtd/web-app_2_3.dtd">
<web-app>
<!-- "Real" elements go here. All are optional. -->
</web-app>
```

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Complete web.xml Ordering (Second-Level Elements)

- icon
- display-name
- description
- distributable
- context-param
- filter
- filter-mapping
- listener
- servlet
- servlet-mapping
- session-config
- mime-mapping

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Complete web.xml Ordering (Continued)

- welcome-file-list
- error-page
- taglib
- resource-env-ref
- resource-ref
- security-constraint
- login-config
- security-role
- env-entry
- ejb-ref
- ejb-local-ref

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Defining Custom URLs

- Start with standard web.xml template
- Next, give name to each servlet


```
<servlet>
  <servlet-name>BashMS</servlet-name>
  <servlet-class>msUtils.ASPTranslator</servlet-class>
</servlet>
```
- Finally, map new URL


```
<servlet-mapping>
  <servlet-name>BashMS</servlet-name>
  <url-pattern>/*.asp</url-pattern>
</servlet-mapping>
```
- Notes
 - Order matters: servlet before servlet-mapping
 - JSP: Use jsp-file instead of servlet-class

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Disabling Invoker Servlet

- Default servlet URL:
 - http://host/webAppPrefix/*servlet*/*ServletName*
- Convenient during development, but for deployment:
 - Init parameters, security settings, filters, etc. are associated only with custom URLs
 - Default URL is long and cumbersome
 - You might want to hide implementation details from users
- Disabling it:
 - In each Web application, redirect requests to other servlet
 - <url-pattern>/servlet/*</url-pattern>
 - Globally
 - Server-specific mechanism

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Disabling Invoker Servlet: Example

```
/** Servlet that simply redirects users to the
 * Web application home page.
 */

public class RedirectorServlet extends HttpServlet {
    public void doGet(HttpServletRequest request,
        HttpServletResponse response)
        throws ServletException, IOException {
        response.sendRedirect(request.getContextPath());
    }

    public void doPost(HttpServletRequest request,
        HttpServletResponse response)
        throws ServletException, IOException {
        doGet(request, response);
    }
}
```

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Disabling Invoker Servlet: Example (Continued)

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<!DOCTYPE web-app PUBLIC
  "-//Sun Microsystems, Inc.//DTD Web Application 2.3//EN"
  "http://java.sun.com/dtd/web-app_2_3.dtd">
<web-app>
  <!-- ... -->
  <servlet>
    <servlet-name>Redirector</servlet-name>
    <servlet-class>utils.RedirectorServlet</servlet-class>
  </servlet>
  <!-- ... -->
  <servlet-mapping>
    <servlet-name>Redirector</servlet-name>
    <url-pattern>/servlet/*</url-pattern>
  </servlet-mapping>
  <!-- ... -->
</web-app>
```

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Who Needs to Customize Servlet Behavior?

- Author
 - Change the actual code
- End user
 - Supply value in HTML form
- Deployer
 - Put initialization values in *web.xml*
- Parallels applet behavior
 - Author changes the code
 - End user manipulates GUI controls
 - Deployer uses PARAM element inside APPLET element in the HTML file.

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Types of Initialization

- Servlets
 - Call ServletConfig.getInitParameter from the init method
- JSP pages
 - Call ServletConfig.getInitParameter from the jspInit method
- Servlet context
 - Call ServletContext.getInitParameter
 - What method to call this from? See lecture on listeners!
- Filters
 - See later lecture
- Listeners
 - See later lecture

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Assigning Servlet Initialization Parameters

```

<servlet>
  <servlet-name>InitTest</servlet-name>
  <servlet-class>
    moreservlets.InitServlet
  </servlet-class>
  <init-param>
    <param-name>firstName</param-name>
    <param-value>Larry</param-value>
  </init-param>
  <init-param>
    <param-name>emailAddress</param-name>
    <param-value>ellison@microsoft.com</param-value>
  </init-param>
</servlet>
    
```

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Reading Servlet Initialization Parameters

```

public class InitServlet extends HttpServlet {
  private String firstName, emailAddress;

  public void init() {
    ServletConfig config = getServletConfig();
    firstName =
      config.getInitParameter("firstName");
    emailAddress =
      config.getInitParameter("emailAddress");
  }

  public void doGet(...) ... { ... }
}
    
```

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Servlet Initialization Parameters: Successful Result

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Servlet Initialization Parameters: Failed Result

- One address works; one fails
- This is too hard to remember!
 - Disable default URL, so there is only 1 address: the one that works!

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Assigning JSP Initialization Parameters

```

<servlet>
  <servlet-name>InitPage</servlet-name>
  <jsp-file>/InitPage.jsp</jsp-file>
  <init-param>
    <param-name>firstName</param-name>
    <param-value>Bill</param-value>
  </init-param>
  <init-param>
    <param-name>emailAddress</param-name>
    <param-value>gates@oracle.com</param-value>
  </init-param>
</servlet>
    
```

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Assigning JSP Initialization Parameters (Continued)

```

<servlet-mapping>
  <servlet-name>InitPage</servlet-name>
  <url-pattern>/InitPage.jsp</url-pattern>
</servlet-mapping>
    
```

- If you leave invoker turned on and have declaration on previous page:
 - Initialized JSP page could be accessed with `http://host/webAppPrefix/servlet/InitPage`. Yuck!
 - Assign URL back to original URL of JSP page instead.

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Reading JSP Initialization Parameters

```

...
<UL>
  <LI>First name: <%= firstName %>
  <LI>Email address: <%= emailAddress %>
</UL>
...
<%!
private String firstName, emailAddress;

public void jspInit() {
  ServletConfig config = getServletConfig();
  firstName =
    config.getInitParameter("firstName");
  emailAddress =
    config.getInitParameter("emailAddress");
}
%>

```

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JSP Initialization Parameters: Result

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Assigning Application-Wide Initialization Parameters

- **web.xml element: context-param**

```

<context-param>
  <param-name>support-email</param-name>
  <param-value>blackhole@mycompany.com</param-value>
</context-param>

```
- Read with the `getInitParameter` method of **ServletContext** (not **ServletConfig**)
- **Problem: who should call `getInitParameter`?**
 - `load-on-startup` gives partial solution
 - Listeners give much better answer

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Loading Servlets or JSP Pages When Server Starts

- What if servlet or JSP page defines data that other resources use?


```

<servlet>
  <servlet-name>...</servlet-name>
  <servlet-class>...</servlet-class>
  <!-- Or jsp-file instead of servlet-class
       but this fails in Tomcat 4.0.1. -->
  <load-on-startup />
</servlet>

```
- You can also specify relative order of multiple preloaded resources


```

<load-on-startup>1</load-on-startup>
...
<load-on-startup>2</load-on-startup>

```

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Specifying Welcome Pages

- What result do you get for `http://host/webAppPrefix/someDirectory/?`
 - Answer: it depends on the server.
 - `index.jsp?`
 - `index.html?`
 - `index.htm?`
 - `default.htm?`
 - A 404 error?
 - A directory listing?
- Make at least the file ordering portable:


```

<welcome-file-list>
  <welcome-file>index.jsp</welcome-file>
  <welcome-file>index.html</welcome-file>
</welcome-file-list>

```

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Designating Pages to Handle Errors

- Pages to use for specific HTTP status codes
 - Use the `error-code` element
 - Within `error-page`
- Pages to use when specific uncaught exceptions are thrown
 - Use the `exception-type` element
 - Within `error-page`
- Page-specific error pages
 - Use `<%@ page errorPage="Relative URL" %>`
 - In individual JSP page, not in `web.xml`

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Error Pages and Status Codes

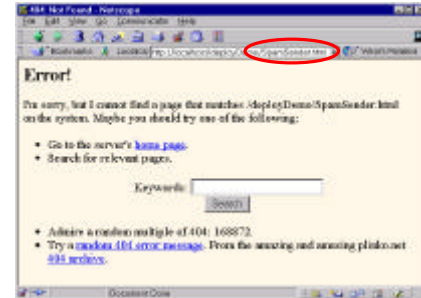
```
<?xml version="1.0" encoding="ISO-8859-1"?>
<!DOCTYPE web-app PUBLIC
"-//Sun Microsystems, Inc.//DTD Web Application 2.3//EN"
"http://java.sun.com/dtd/web-app_2_3.dtd">

<web-app>
  <error-page>
    <error-code>404</error-code>
    <location>/NotFound.jsp</location>
  </error-page>
  <!-- ... -->
</web-app>
```

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Error Pages and Status Codes: Result



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A Dangerous Computation

```
package moreservlets;

/** Exception used to flag particularly onerous
programmer blunders. Used to illustrate the
exception-type web.xml element.
*/

public class DumbDeveloperException extends Exception {
  public DumbDeveloperException() {
    super("Duh. What was I *thinking*?");
  }

  public static int dangerousComputation(int n)
  throws DumbDeveloperException {
    if (n < 5) {
      return(n + 10);
    } else {
      throw(new DumbDeveloperException());
    }
  }
}
```

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A Risky Page

```
<!DOCTYPE HTML PUBLIC
"-//W3C//DTD HTML 4.0 Transitional//EN">

<HTML>
<HEAD><TITLE>Risky JSP Page</TITLE></HEAD>
<BODY BGCOLOR="#FDF5E6">
<H2>Risky Calculations</H2>
<%@ page import="moreservlets.*" %>
<% int n = ((int)(10 * Math.random())); %>
<UL>
  <LI>n: <%= n %>
  <LI>dangerousComputation(n):
    <%= DumbDeveloperException.dangerousComputation(n) %>
</UL>
</BODY></HTML>
```

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Declaring Error Page for DDE

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<!DOCTYPE web-app PUBLIC
"-//Sun Microsystems, Inc.//DTD Web Application 2.3//EN"
"http://java.sun.com/dtd/web-app_2_3.dtd">

<web-app>
  <error-page>
    <exception-type>
      moreservlets.DumbDeveloperException
    </exception-type>
    <location>/DDE.jsp</location>
  </error-page>
  <!-- ... -->
</web-app>
```

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DDE.jsp

```
<!DOCTYPE HTML PUBLIC
"-//W3C//DTD HTML 4.0 Transitional//EN">

<HTML>
<HEAD><TITLE>Dumb</TITLE></HEAD>
<BODY BGCOLOR="#FDF5E6">
<H2>Dumb Developer</H2>
We're brain dead. Consider using our competitors.
</BODY></HTML>
```

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Error Pages and Exceptions: Results

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Other web.xml Capabilities

- Documenting Web app
 - icon
 - display-name
 - description
- Mapping files to MIME types
 - mime-mapping
- More that we'll see later in the course
 - Designating security settings
 - Declaring filters
 - Setting up listeners
 - Specifying tag library validators

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Summary

- URLs
 - servlet
 - servlet-class
 - servlet-name
 - url-pattern
- Init parameters
 - init-param
- Welcome pages
 - welcome-file-list
- Error pages
 - error-page
 - error-code
 - exception-type

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Questions?

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More Information

- Source code for examples
 - <http://www.moreservlets.com>
- **More Servlets & JSP**
 - <http://www.moreservlets.com>
 - Site includes info on servlet and JSP training courses
- **Core Servlets & JSP**
 - Prequel to *More Servlets & JSP*
 - <http://www.coreservlets.com>
- Servlet home page
 - <http://java.sun.com/products/servlet/>
- JavaServer Pages home page
 - <http://java.sun.com/products/jsp/>

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