



## Using and Deploying Web Applications

Core Servlets & JSP book: [www.coreservlets.com](http://www.coreservlets.com)  
 More Servlets & JSP book: [www.moreservlets.com](http://www.moreservlets.com)  
 Servlet and JSP Training Courses: [courses.coreservlets.com](http://courses.coreservlets.com)

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## Agenda

- Purpose of Web applications
- Structure of Web applications
- Setting up Web applications with Tomcat
- Sharing data among Web applications

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## Idea of Web Applications

- **Servlets, JSP pages, HTML files, utility classes, beans, tag libraries, etc. are bundled together in a single directory hierarchy or file**
- **Access to content in the Web app is always through a URL that has a common prefix**
  - `http://host/webAppPrefix/blah/blah`
- **Many aspects of Web application behavior controlled through **deployment descriptor (web.xml)****
  - The deployment descriptor is covered in detail in the next section.

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## Purposes of Web Applications

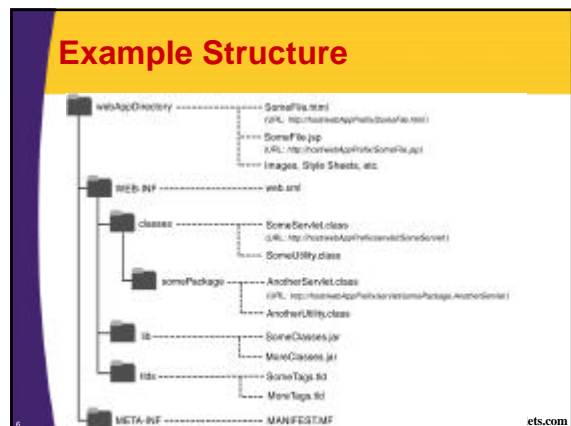
- **Organization**
  - Related files grouped together in a single file or directory hierarchy.
    - HTML files, JSP pages, servlets, beans, images, etc.
- **Portability**
  - All compliant servers support Web apps.
  - Can redeploy on new server by moving a *single file*.
- **Separation**
  - Each Web app has its own:
    - ServletContext
    - Class loader
    - Sessions
    - URL prefix
    - Directory structure

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## Structure of a Web Application

- **JSP and regular Web content (HTML, style sheets, images, etc.):**
  - Main directory or a subdirectory thereof.
- **Servlets:**
  - WEB-INF/classes (if servlet is unpackaged - i.e. in default package)
  - A subdirectory thereof that matches the package name.
- **Unjarred beans and utility classes:**
  - Same place as servlets (but *always* use packages!)
- **JAR files:**
  - WEB-INF/lib.
- **web.xml:**
  - WEB-INF
- **Tag Library Descriptor files:**
  - WEB-INF or subdirectory thereof
- **Files in WEB-INF not directly accessible to outside clients**

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## Velocity, WebMacro, and Other Alternatives to JSP Technology

- **Issues**
  - Standardization
  - Portability
  - Integration
  - Industry support
  - Technical features
- **Arguments for alternatives focus almost exclusively on last issue**
  - Even if proponents were right about all their technical arguments, would that matter?

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## Alternatives to JSP Technology: Integration Issues

- **Web apps give standard location for:**
  - Servlets, JSP pages, and regular Web content
  - Not for Velocity or WebMacro pages
- **Security settings apply to**
  - Servlets, JSP pages, and regular Web content
  - Not Velocity or WebMacro pages
- **Initialization parameters defined for**
  - Servlets and JSP pages
  - Not Velocity or WebMacro pages
- **Filters apply to**
  - Servlets, JSP pages, and regular Web content
  - Not Velocity or WebMacro pages
- **Listeners apply to**
  - Servlets, JSP pages, and regular Web content
  - Not Velocity or WebMacro pages

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## Registering a Web Application

- **Process is server-specific!**
  - Portable:
    - File structure and deployment descriptor (web.xml).
  - Not portable:
    - The way to tell a server where a Web app is located
    - The way to assign a URL prefix
- **Tomcat**
  - Just drop directory or WAR file (JAR file containing Web app directory structure) in `install_dir/webapps`
    - JRun and others have similar "autodeploy" feature
  - Put directory anywhere and add a Context entry to `install_dir/conf/server.xml`
- **Other servers (Caucho, WebLogic, WebSphere, etc.)**
  - Use administration console

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## Registering a Web Application with Tomcat: Details

- **Autodeploy**
  - Go to `install_dir/webapps`, and make a copy of the `ROOT` directory. (R-click on `ROOT`, drag, release, and select "Copy". Remember there is a shortcut to `install_dir/webapps` in your `C:\Servlets+JSP` directory).
  - Rename the directory to a name of your choosing (say `testApp`)
  - Restart server
  - Resultant URLs:
    - `http://localhost/testApp/servlet/SomeServlet`
    - `http://localhost/testApp/SomeFile.jsp`
- **Explicit Configuration**
  - `install_dir/conf/server.xml`:
    - `<Context path="/testApp" docBase="testApp" />`

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## The Art of WAR (Files)

- **WAR files are simply JAR files with a different file extension**
- **All servers are required to support Web apps that are in WAR files**
  - Technically, they are not absolutely required to support unbundled Web apps.
- **To create a WAR file, change directory to top-level Web app directory and do:**
  - `jar cvf webAppName.war *`
- **Registering is still server-specific**
  - Tomcat: just drop WAR file in `install_dir/webapps`
  - `webAppName` becomes Web application URL prefix

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## Handling Relative URLs: Problem

- **Individual JSP or HTML page: easy to load image from relative location**
  - `<IMG SRC="EvilEmpire.gif" ...>`
  - `<IMG SRC="redmond/EvilEmpire.jpg" ...>`
- **What about servlets?**
  - Same strategy doesn't work
  - Default servlet URL: `http://host/prefix/servlet/Name`
  - *Browser*, not *server*, resolves relative URL
- **What if same image is used by JSP or HTML pages scattered throughout app?**
  - Same problem
- **Same problem: style sheets, applets, even regular hypertext links**

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## Handling Relative URLs: Solutions

- Use the Web application name in the URL.
  - <IMG SRC="/webAppPrefix/redmond/Borg.gif" ...>
- Use web.xml to assign URLs that are at the top level of the Web application
  - Change http://host/webAppPrefix/servlet/SomeName to just http://host/webAppPrefix/SomeName
  - More useful for servlets than for JSP
- Use getContextPath.
 

```
<HEAD>
<BASE HREF="<%= request.getContextPath() %>">
<TITLE>...</TITLE>
</HEAD>
```

## Sharing Data Among Web Applications

- Failure:
  - Sessions. Each Web app has its own set of sessions.
  - Standard ServletContext. Each Web app has a separate one.
  - Static methods or fields. Each Web app uses a different ClassLoader.
- Success:
  - Explicit cookies. Cookies are shared by the whole site (even the whole top-level domain if set appropriately).
    - Be sure to do `cookie.setPath("/")`, however.
  - ServletContext associated with a specific URL.
 

```
ServletContext myContext =
    getServletContext();
String url = "/someWebAppPrefix";
ServletContext otherContext =
    myContext.getContext(url);
Object someData =
    otherContext.getAttribute("someKey");
```

## Setting Shared Data: Example

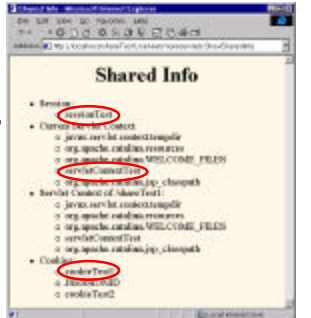
```
public class SetSharedInfo extends HttpServlet {
    public void doGet(HttpServletRequest request,
        HttpServletResponse response)
        throws ServletException, IOException {
        HttpSession session = request.getSession(true);
        session.setAttribute("sessionTest", "Session Entry One");
        ServletContext context = getServletContext();
        context.setAttribute("servletContextTest",
            "Servlet Context Entry One");
        Cookie c1 = new Cookie("cookieTest1", "Cookie One");
        c1.setMaxAge(3600); // One hour
        response.addCookie(c1); // Default path
        Cookie c2 = new Cookie("cookieTest2", "Cookie Two");
        c2.setMaxAge(3600); // One hour
        c2.setPath("/"); // Explicit path: all URLs
        response.addCookie(c2);
        String url = request.getContextPath() +
            "/servlet/moreservlets.ShowSharedInfo";
        // In case session tracking is based on URL rewriting.
        url = response.encodeRedirectURL(url);
        response.sendRedirect(url);
    }
}
```

## Displaying Shared Data: Example

```
public class ShowSharedInfo extends HttpServlet {
    public void doGet(HttpServletRequest request,
        HttpServletResponse response)
        throws ServletException, IOException {
        response.setContentType("text/html");
        PrintWriter out = response.getWriter();
        String title = "Shared Info";
        out.println(ServletUtilities.headWithTitle(title) +
            "<BODY BGCOLOR=\"#FDF5E6\">\n" +
            "<H1 ALIGN=\"CENTER\">" + title + "</H1>\n"+
            "...");
        HttpSession session = request.getSession(true);
        ...
        ServletContext application = getServletContext();
        ...
        application = application.getContext("/shareTest1");
        ...
        Cookie[] cookies = request.getCookies();
```

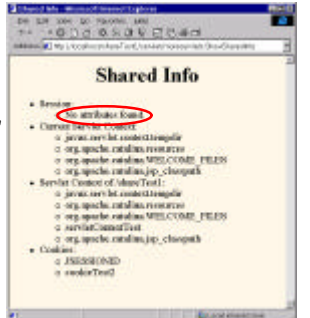
## Accessing shareTest1 Web App

- Current Web App: `shareTest1`
- "sessionTest" placed in the current session
- "servletContextTest" placed in the servlet context
- cookieTest1: default path
- cookieTest2: `setPath("/")`



## Accessing shareTest1 Web App

- Current Web App: `shareTest2`
- "sessionTest" placed in the current session
- "servletContextTest" placed in the servlet context
- cookieTest1: default path
- cookieTest2: `setPath("/")`



## Summary

- **Web application benefits**
  - Easy deployment
  - Isolation from other applications
- **Structure**
  - Top-level directory or subdirectory other than WEB-INF:
    - JSP, HTML, other Web content
  - WEB-INF
    - web.xml
  - WEB-INF/classes/directoryMatchingPackage
    - Servlets, beans, utilities
- **Creating a Web app in Tomcat**
  - Just make a directory with proper structure (eg WEB-INF and WEB-INF/classes subdirectories) in install\_dir/webapps.
  - That directory name becomes the URL prefix.

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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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