Application Overview in STRUTS

Struts is an open source framework that extends the Java Servlet API and employs a Model, View, Controller (MVC) architecture. It enables you to create maintainable, extensible, and flexible web applications based on standard technologies, such as JSP pages, JavaBeans, resource bundles, and XML.

This tutorial teaches you how to build a simple MVC application that displays a login page and returns a success page upon submitting data that passes validation. You learn several basic features provided by Struts, as well as how these features are implemented using the IDE. Specifically, you use Struts tags in JSP pages, maintain user data with a Struts ActionForm bean, and implement forwarding logic using a Struts Action object. You are also shown how to implement simple validation to your application, including setting up warning message for a failed login attempt.

Overview of the Application

When you use Struts, the framework provides you with a controller servlet, ActionServlet, which is defined in the Struts libraries that are included in the IDE, and which is automatically registered in the web.xml deployment descriptor as shown below. The controller servlet uses a struts-config.xml file to map incoming requests to Struts Action objects, and instantiate any ActionForm objects associated with the action to temporarily store form data. The Action object processes requests using its execute method, while making use of any data stored in the form bean. Once the Action object processes a request, it stores any new data (i.e., in the form bean, or in a separate result bean), and forwards the results to the appropriate view.

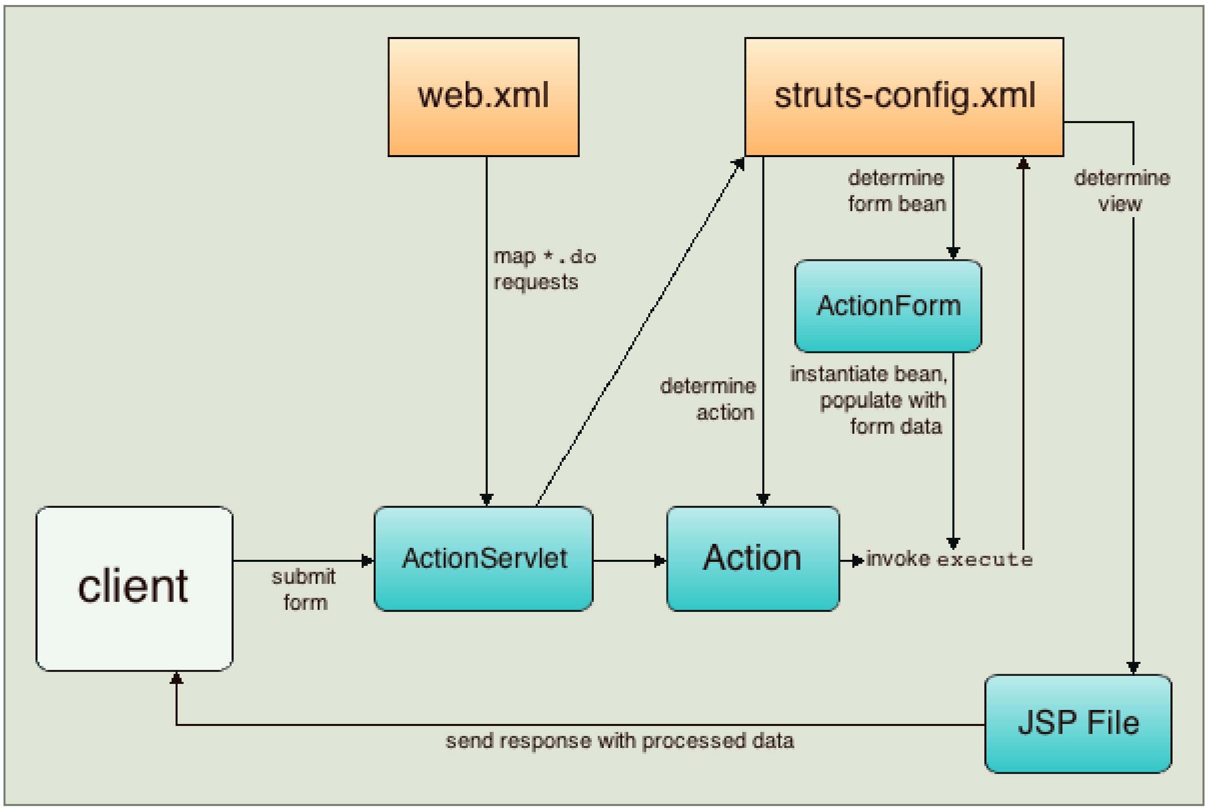


Figure 2. Struts workflow

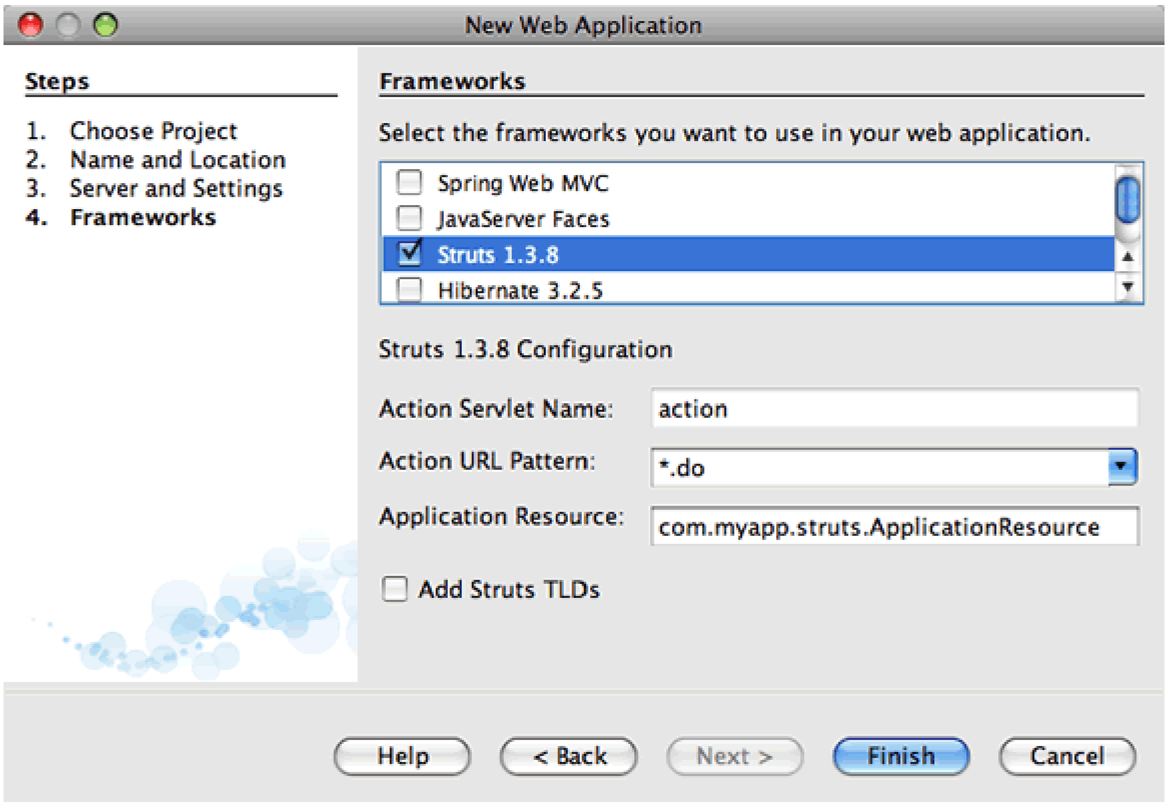
Developing a Struts application is similar to developing any other kind of web application in NetBeans IDE. However, you complement your web development toolkit by taking advantage of the Struts support provided by the IDE. For example, you use templates in the IDE to create Struts Action objects and ActionForm beans. Upon creation, the IDE automatically registers these classes in the struts-config.xml file and lets you extend this file very easily using menu items in the Source Editor's right-click menu. Because many web applications use JSP pages for the view, Struts also provides custom tag libraries which facilitate interaction with HTML forms. Within the IDE's Source Editor, you can invoke code completion and Javadoc support that helps you to work efficiently with these libraries.

The following steps demonstrate how to create a simple form that collects user data, performs simple validation, and outputs the data on a success page.

Setting Up a Struts Application

In the IDE, a Struts application is nothing more than a normal web application accompanied by the Struts libraries and configuration files. You create a Struts application in the same way as you create any other web application in the IDE - using the New Web Application wizard, with the additional step of indicating that you want the Struts libraries and configuration files to be included in your application.

1. Choose File > New Project (Ctrl-Shift-N; ⌘-Shift-N on Mac) from the main menu. Select Java Web in the list of Categories and then select Web Application in the list of Projects. Click Next.
2. In the Name and Location panel, enter MyStrutsApp for Project Name and click Next.
3. In the Server and Settings panel, select the server to which you want to deploy your application. Only servers that are registered with the IDE are listed. (To register a server, click Add next to the Server drop-down list.) Also, note that the Context Path to your deployed application becomes /MyStrutsApp. Click Next.
4. Select Struts in the Frameworks panel.


New Web Application

Steps

1. Choose Project
2. Name and Location
3. Server and Settings
4. **Frameworks**

Frameworks

Select the frameworks you want to use in your web application.

- [ ] Spring Web MVC
- [ ] JavaServer Faces
- [✓] Struts 1.3.8
- [ ] Hibernate 3.2.5

Struts 1.3.8 Configuration

Action Servlet Name: action

Action URL Pattern: *.do

Application Resource: com.myapp.struts.ApplicationResource

- [ ] Add Struts TLDs

Figure 3. Struts option displays in Frameworks panel of New Web Application wizard

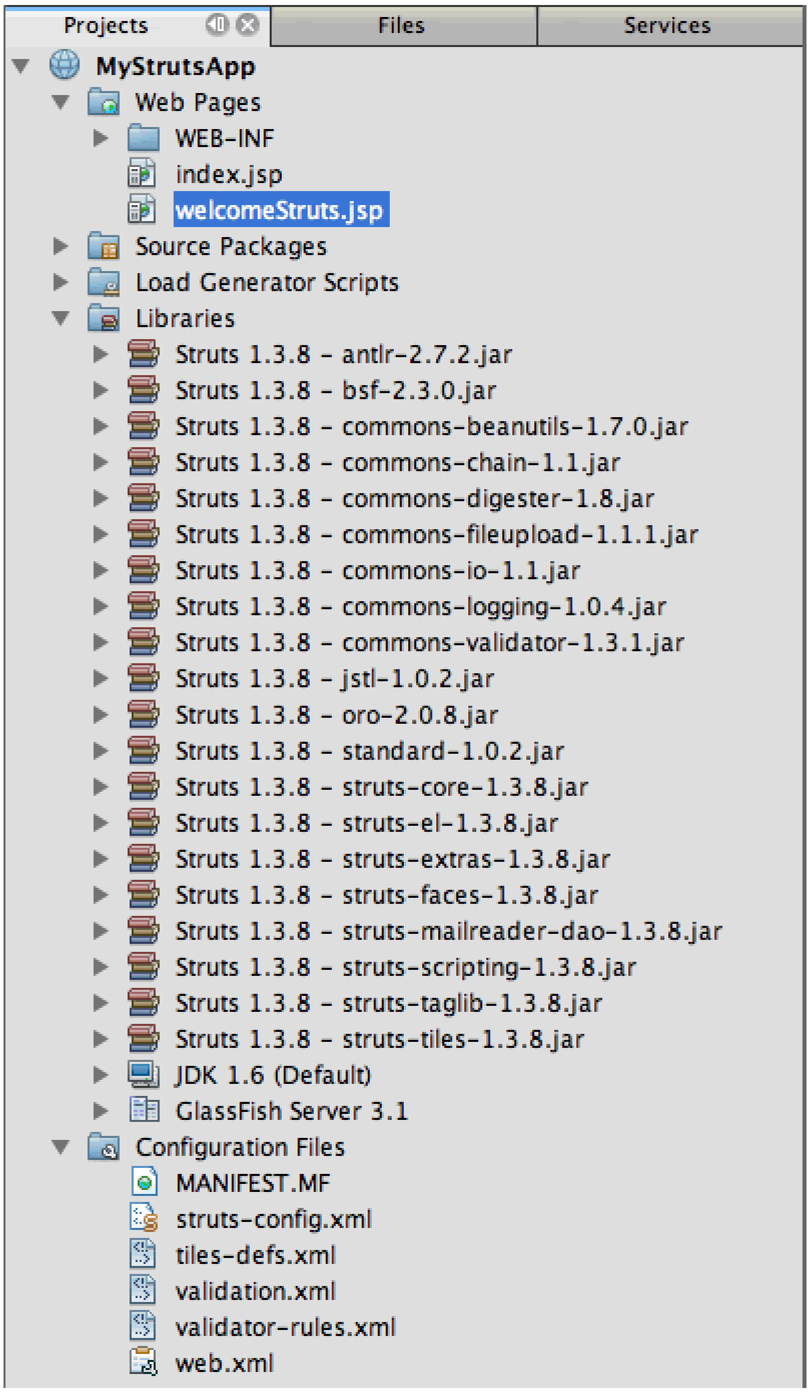
For purposes of this tutorial, do not change any of the configuration values in the lower region of this panel. The wizard displays the following configuration options.

- **Action Servlet Name**: The name of the Struts action servlet used in the application. The web.xml deployment descriptor contains an entry for the action servlet and specifies the appropriate Struts-specific parameters, such as the path to the servlet class within the Struts library and to the struts-config.xml configuration file within the application.

- **Action URL Pattern**: Specifies the patterns of incoming requests which are mapped to the Struts action controller. This generates a mapping entry in the deployment descriptor. By default, only the *.do pattern is mapped.
- **Application Resource**: Lets you specify the resource bundle which will be used in the struts-config.xml file for localizing messages. By default, this is com.myapp.struts.ApplicationResource.
- **Add Struts TLDs**: Lets you generate tag library descriptors for the Struts tag libraries. A tag library descriptor is an XML document which contains additional information about the entire tag library as well as each individual tag. In general this is not necessary, because you can refer to on-line URIs rather than local TLD files.

    1. Click Finish. The IDE creates the project folder in your file system. As with any web application in the IDE, the project folder contains all of your sources and the IDE's project metadata, such as the Ant build script. However, your web application in addition has all of the Struts libraries on its classpath. Not only are they on the application's classpath, but they are included in the project and will be packaged with it later when you build the project.

The project opens in the IDE. The Projects window is the main entry point to your project sources. It shows a logical view of important project contents. For example, if you expand several nodes within the new project, it may appear as follows:



```
▼ MyStrutsApp
  ▼ Web Pages
    ▶ WEB-INF
      index.jsp
      welcomeStruts.jsp
  ▶ Source Packages
  ▶ Load Generator Scripts
  ▼ Libraries
    ▶ Struts 1.3.8 - antlr-2.7.2.jar
    ▶ Struts 1.3.8 - bsf-2.3.0.jar
    ▶ Struts 1.3.8 - commons-beanutils-1.7.0.jar
    ▶ Struts 1.3.8 - commons-chain-1.1.jar
    ▶ Struts 1.3.8 - commons-digester-1.8.jar
    ▶ Struts 1.3.8 - commons-fileupload-1.1.1.jar
    ▶ Struts 1.3.8 - commons-io-1.1.jar
    ▶ Struts 1.3.8 - commons-logging-1.0.4.jar
    ▶ Struts 1.3.8 - commons-validator-1.3.1.jar
    ▶ Struts 1.3.8 - jstl-1.0.2.jar
    ▶ Struts 1.3.8 - oro-2.0.8.jar
    ▶ Struts 1.3.8 - standard-1.0.2.jar
    ▶ Struts 1.3.8 - struts-core-1.3.8.jar
    ▶ Struts 1.3.8 - struts-el-1.3.8.jar
    ▶ Struts 1.3.8 - struts-extras-1.3.8.jar
    ▶ Struts 1.3.8 - struts-faces-1.3.8.jar
    ▶ Struts 1.3.8 - struts-mailreader-dao-1.3.8.jar
    ▶ Struts 1.3.8 - struts-scripting-1.3.8.jar
    ▶ Struts 1.3.8 - struts-taglib-1.3.8.jar
    ▶ Struts 1.3.8 - struts-tiles-1.3.8.jar
    ▶ JDK 1.6 (Default)
    ▶ GlassFish Server 3.1
  ▼ Configuration Files
      MANIFEST.MF
      struts-config.xml
      tiles-defs.xml
      validation.xml
      validator-rules.xml
      web.xml
```

Figure 4. Projects window displays MyStrutsApp project

*Note: *Use the Files window (Window > Files) to see all of your project contents in a directory-based view.

The Struts-specific configuration files, as well as the application's deployment descriptor, are conveniently placed within the Configuration Files folder. Open the deployment descriptor (double-click the web.xml file node to have it display in the Source Editor). In order to handle Struts processing, a mapping is provided for the Struts controller servlet.

```
<servlet>

    <servlet-name>action</servlet-name>

    <servlet-class>org.apache.struts.action.ActionServlet</servlet-class>

    <init-param>

        <param-name>config</param-name>

        <param-value>/WEB-INF/struts-config.xml</param-value>

    </init-param>

    <init-param>

        <param-name>debug</param-name>

        <param-value>2</param-value>

    </init-param>

    <init-param>

       <param-name>detail</param-name>

       <param-value>2</param-value>

    </init-param>

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

</servlet>

<servlet-mapping>

    <servlet-name>action</servlet-name>

    <url-pattern>*.do</url-pattern>

</servlet-mapping>
```

Above, the Struts controller servlet is named action and is defined in the Struts library (org.apache.struts.action.ActionServlet). It is set to handle all requests that satisfy the *.do mapping. In addition, initialization parameters for the servlet are specified by means of the struts-config.xml file, also contained in the WEB-INF folder.

Creating JSP Pages

Begin by creating two JSP pages for the application. The first displays a form. The second is the view returned when login is successful.

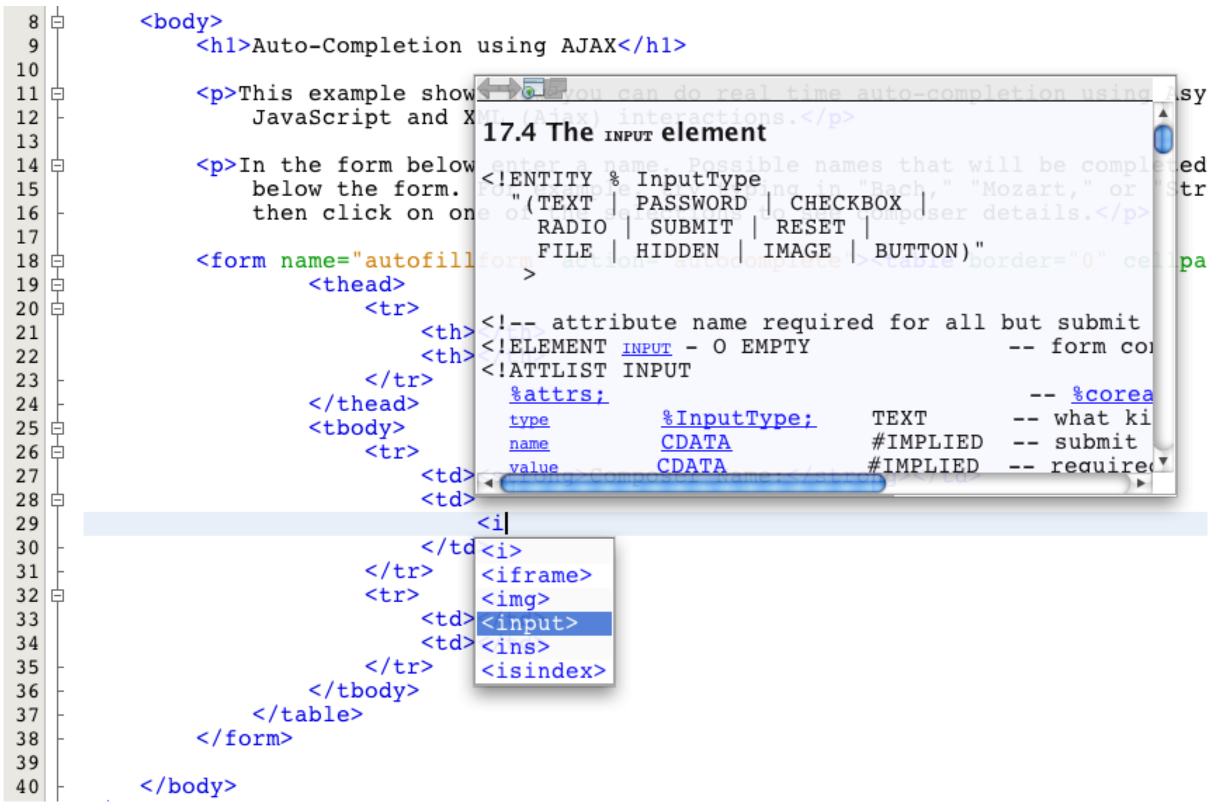
- Creating a Login Page
- Creating a Success Page

Creating a Login Page

1. Right-click the MyStrutsApp project node, choose New > JSP, and name the new file login. Click Finish. The login.jsp file opens in the Source Editor.
2. In the Source Editor, change the content of both the <title> and <h1> tags (or <h2> tags, depending on the IDE version you are using) to Login Form.
3. Add the following two taglib directives to the top of the file:

```
<%@ taglib uri="http://struts.apache.org/tags-bean" prefix="bean" %>

<%@ taglib uri="http://struts.apache.org/tags-html" prefix="html" %>
```

Many web applications use JSP pages for views in the MVC paradigm, so Struts provides custom tag libraries which facilitate interaction with HTML forms. These can be easily applied to a JSP file using the IDE’s support for code completion. When you type in the Source Editor, the IDE provides you with code completion for Struts tags, as well as the Struts Javadoc. You can also invoke code completion manually by pressing Ctrl-Space:



```
    <body>
        <h1>Auto-Completion using AJAX</h1>

        <p>This example show                                                  sy
            JavaScript and X

        <p>In the form below                                                 ed
            below the form.                                                   tr
            then click on on

        <form name="autofill                                                  pa
                <thead>
                    <tr>
                        <th>
                        <th>
                    </tr>
                </thead>
                <tbody>
                    <tr>
                        <td>
                        <td>
                            <i
                        </td
                    </tr>
                    <tr>
                        <td>
                        <td>
                    </tr>
                </tbody>
            </table>
        </form>

    </body>
```

17.4 The INPUT element

```
<!ENTITY % InputType
  "(TEXT | PASSWORD | CHECKBOX |
    RADIO | SUBMIT | RESET |
    FILE | HIDDEN | IMAGE | BUTTON)"
   >

<!-- attribute name required for all but submit
<!ELEMENT INPUT - O EMPTY                    -- form co
<!ATTLIST INPUT
  %attrs;                                    -- %corea
  type          %InputType;    TEXT          -- what ki
  name          CDATA          #IMPLIED      -- submit
  value         CDATA          #IMPLIED      -- require
```

```
<i>
<iframe>
<img>
<input>
<ins>
<isindex>
```

Figure 5. Code completion and Javadoc are supplied for Struts tags

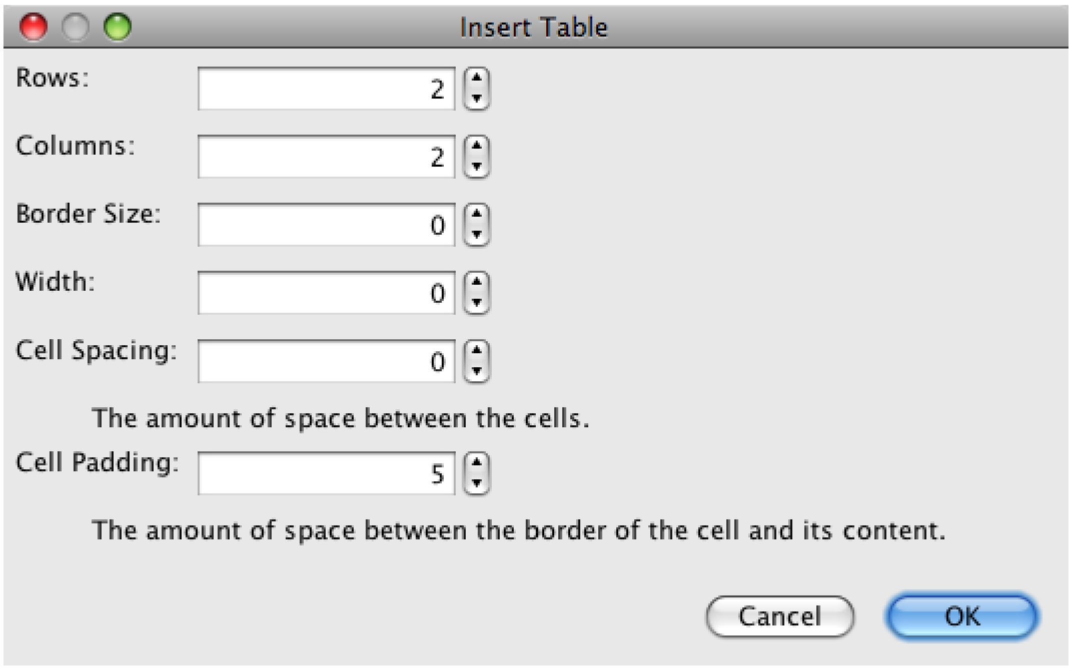
The bean taglib provides you with numerous tags that are helpful when associating a form bean (i.e., an ActionForm bean) with the data collected from the form. The html taglib offers an interface between the view and other components necessary to a web application. For example, below you replace common html form tags with Struts' <html:form> tags. One benefit this provides is that it causes the server to locate or create a bean object that corresponds to the value provided for html:form’s `action element.

1. Below the <h1> (or <h2>) tags, add the following:

```
<html:form action="/login">



  <html:submit value="Login" />



</html:form>
```

Whenever you finish typing in the Source Editor, you can tidy up the code by right-clicking and choosing Format (Alt-Shift-F).

1. In the Palette (Window > Palette) in the right region of the IDE, drag a Table item from the HTML category to a point just above the <html:submit value="Login" /> line. The Insert Table dialog box displays. Set the rows to 3, columns to 2, and leave all other settings at 0. Later in the tutorial, you will attach a stylesheet to affect the table display.



Rows:	2
Columns:	2
Border Size:	0
Width:	0
Cell Spacing:	0

The amount of space between the cells.

Cell Padding:	5

The amount of space between the border of the cell and its content.

Figure 6. The Palette provides dialogs for easy-to-use code templates

Click OK, then optionally reformat the code (Alt-Shift-F). The form in login.jsp now looks as follows:

```
<html:form action="/login">

   <table border="0">

      <thead>

         <tr>

            <th></th>

            <th></th>
            </tr>
        </thead>
        <tbody>
            <tr>
                <td></td>
                <td></td>
            </tr>
            <tr>
                <td></td>
                <td></td>
            </tr>
            <tr>
                <td></td>
                <td></td>
            </tr>
        </tbody>
    </table>

    <html:submit value="Login" />

</html:form>
```

*Note: *You can safely delete the <thead> table row, as it is not used in this tutorial.

1. In the first table row, enter the following (changes in **bold**):

```
<tr>

   <td>*Enter your name:*</td>

   <td>*<html:text property="name" />*</td>

</tr>
```

1. In the second table row, enter the following (changes in **bold**):

```
<tr>

   <td>*Enter your email:*</td>

   <td>*<html:text property="email" />*</td>

</tr>
```

The html:text element enables you to match the input fields from the form with properties in the form bean that will be created in the next step. So for example, the value of property must match a field declared in the form bean associated with this form.

1. Move the <html:submit value="Login" /> element into the second column of the third table row, so that the third table row appears as follows (changes in **bold**):

```
<tr>

   <td></td>

   <td>*<html:submit value="Login" />*</td>

</tr>
```

At this stage, your login form should look as follows:

```
<html:form action="/login">
```

```
    <table border="0">

        <tbody>

            <tr>

                <td>Enter your name:</td>

                <td><html:text property="name" /></td>

            </tr>

            <tr>

                <td>Enter your email:</td>

                <td><html:text property="email" /></td>

            </tr>

            <tr>

                <td></td>

                <td><html:submit value="Login" /></td>

            </tr>

        </tbody>

    </table>

</html:form>
```

Creating a Success Page

1. Right-click the MyStrutsApp project node, choose New > JSP, and name the new file success. In the Folder field, click the adjacent Browse button and select WEB-INF from the dialog that displays. Click Select Folder to enter WEB-INF in the Folder field. Any files contained in the WEB-INF folder are not directly accessible to client

requests. In order for success.jsp to be properly displayed, it must contain processed data. Click Finish.

2. In the Source Editor, change the content of the newly created page to the following:

```
<head>

   <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">

   <title>Login Success</title>

</head>

<body>

   <h1>Congratulations!</h1>



   <p>You have successfully logged in.</p>



   <p>Your name is: .</p>



   <p>Your email address is: .</p>

</body>
```

1. Add a bean taglib directive to the top of the file:

```
<%@ taglib uri="http://struts.apache.org/tags-bean" prefix="bean" %>
```

1. Add the following <bean:write> tags (changes in **bold**):

```
<p>Your name is: *<bean:write name="LoginForm" property="name" />*.</p>



<p>Your email address is: *<bean:write name="LoginForm" property="email" />*.</p>
```

By employing the <bean:write> tags, you make use of the bean taglib to locate the ActionForm bean you are about to create, and display the user data saved for name and email.

Creating an ActionForm Bean

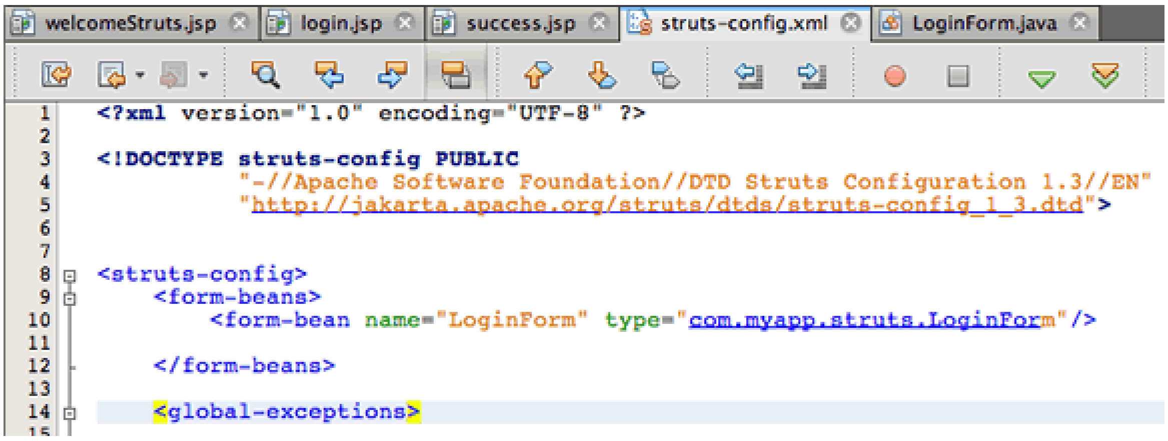
A Struts ActionForm bean is used to persist data between requests. For example, if a user submits a form, the data is temporarily stored in the form bean so that it can either be redisplayed in the form page (if the data is in an invalid format or if login fails) or displayed in a login success page (if data passes validation).

1. Right-click the MyStrutsApp project node and choose New > Other. Under Categories choose Struts, then under File Types choose Struts ActionForm Bean. Click Next.
2. Type in LoginForm for the Class Name. Then select com.myapp.struts in the Package drop-down list and click Finish.

The IDE creates the LoginForm bean and opens it in the Source Editor. By default, the IDE provides it with a String called name and an int called number. Both fields have accessor methods defined for them. Also, the IDE adds a bean declaration to the struts-config.xml file. If you open the struts-config.xml file in the Source Editor, you can see the following declaration, which was added by the wizard:

```
<form-beans>

   *<form-bean name="LoginForm" type="com.myapp.struts.LoginForm" />*

</form-beans>
```

The IDE provides navigation support in the struts-config.xml file. Hold down the Ctrl key and hover your mouse over the LoginForm bean’s fully qualified class name. The name becomes a link, enabling you to navigate directly to the class in the Source Editor:



```
<?xml version="1.0" encoding="UTF-8" ?>

<!DOCTYPE struts-config PUBLIC
          "-//Apache Software Foundation//DTD Struts Configuration 1.3//EN"
          "http://jakarta.apache.org/struts/dtds/struts-config_1_3.dtd">


<struts-config>
    <form-beans>
        <form-bean name="LoginForm" type="com.myapp.struts.LoginForm"/>

    </form-beans>

    <global-exceptions>
```

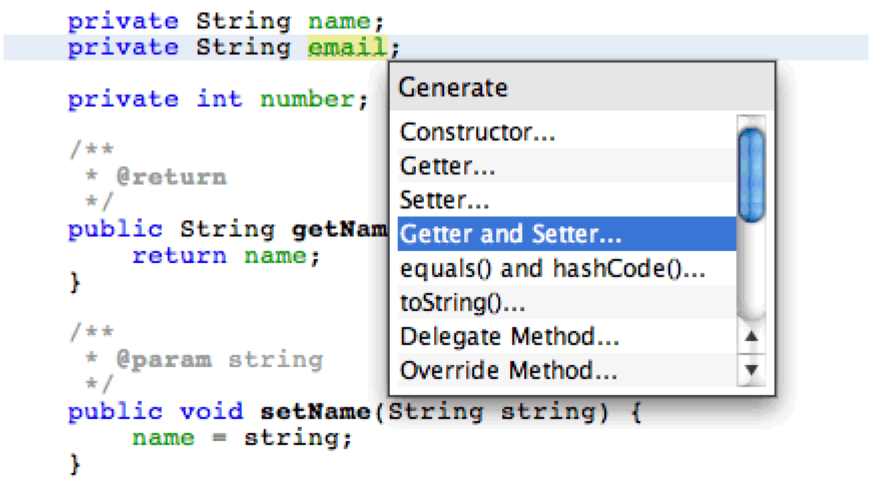
Figure 7. Navigation support is provided in struts-config.xml

1. In the LoginForm bean in the Source Editor, create fields and accompanying accessor methods that correspond to the name and email text input fields that you created in login.jsp. Because name has already been created in the LoginForm skeleton, you only need to implement email.

Add the following declaration beneath name (changes in **bold**):

```
private String name;

*private String email;*
```

To create accessor methods, place your cursor on email and press Alt-Insert.



```
    private String name;
    private String email;

    private int number;

    /**
     * @return
     */
    public String getNam
        return name;
    }

    /**
     * @param string
     */
    public void setName(String string) {
        name = string;
    }
```

Figure 8. Insert Code menu displays when pressing Ctrl-I in Source Editor

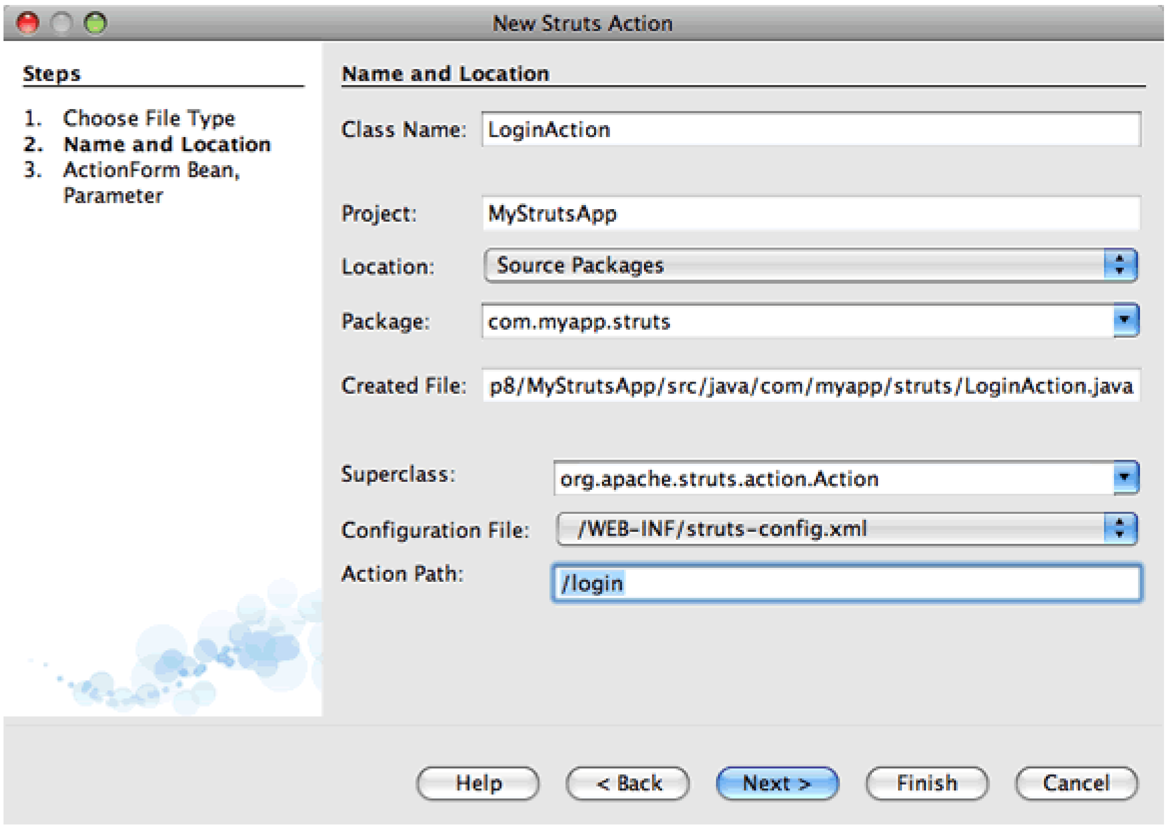
Select Getter and Setter, then in the dialog that displays, select email : String and click Generate. Accessor methods are generated for the email field.

*Note: *You can delete the declaration and accessor methods for number, as it is not used in this tutorial.

Creating an Action Class

The Action class contains the business logic in the application. When form data is received, it is the execute method of an Action object that processes the data and determines which view to forward the processed data to. Because the Action class is integral to the Struts framework, NetBeans IDE provides you with a wizard.

1. In the Projects window, right-click the MyStrutsApp project node and choose New > Other. From the Struts category choose Struts Action and click Next.
2. In the Name and Location panel, change the name to LoginAction.
3. Select com.myapp.struts in the Package drop-down list.
4. Type /login in Action Path. This value must match the value you set for the action attribute of the <html:form> tags in login.jsp. Make sure settings appear as in the screenshot below, then click Next.



Class Name: LoginAction
Project: MyStrutsApp
Location: Source Packages
Package: com.myapp.struts
Created File: p8/MyStrutsApp/src/java/com/myapp/struts/LoginAction.java
Superclass: org.apache.struts.action.Action
Configuration File: /WEB-INF/struts-config.xml
Action Path: /login

Figure 9. New Struts Action wizard

1. In the third step of the wizard, you are given the opportunity to associate the Action class with a form bean. Notice that the LoginForm bean you previously created is listed as an option for ActionForm Bean Name. Make the following adjustments to the panel:
    - Delete the forward slash for the Input Resource field
    - Set Scope to Request (Session is the default scope setting in Struts.)
    - Deselect the Validate ActionForm Bean option Click Finish.
      The LoginAction class is generated, and the file opens in the Source Editor.
      Also note that the following action entry is added to the struts-config.xml file:

```
<action-mappings>

   *<action name="LoginForm" path="/login" scope="request"
type="com.myapp.struts.LoginAction" validate="false"/>*

   <action path="/Welcome" forward="/welcomeStruts.jsp"/>

</action-mappings>
```

The name and scope attributes apply to the form bean that is associated with the action. Specifically, when an incoming request matches /login, the Struts framework automatically instantiates a LoginForm object and populates it with the form data sent in the request. The default value of validate is set to true. This tells the framework to call the validate method of the form bean. You deselected this option in the wizard however because you will hand-code simple validation in the next step, which does not require the validate method.

Implementing Validation

In the Source Editor, browse through the LoginAction class and look at the execute method:

```
public ActionForward execute(ActionMapping mapping, ActionForm form,

   HttpServletRequest request, HttpServletResponse response)

   throws Exception {
    return mapping.findForward(SUCCESS);

}
```

Notice the definition of SUCCESS, listed beneath the LoginAction class declaration:

```
private final static String SUCCESS = "success";
```

Currently, the mapping.findForward method is set to unconditionally forward any request to an output view called success. This is not really desirable; you want to first perform some sort of validation on the incoming data to determine whether to send the success view, or any different view.

- Accessing Bean Data and Preparing a Forwarding Condition
- Setting Up an Error Message

Accessing Bean Data and Preparing a Forwarding Condition

1. Type in the following code within the body of the execute method:

```
// extract user data

LoginForm formBean = (LoginForm)form;

String name = formBean.getName();

String email = formBean.getEmail();
```

In order to use the incoming form data, you need to take execute's `ActionForm argument and cast it as LoginForm, then apply the getter methods that you created earlier.

1. Type in the following conditional clause to perform validation on the incoming data:

```
// perform validation

if ((name == null) ||           // name parameter does not exist

    email == null  ||           // email parameter does not exist
    name.equals("") ||           // name parameter is empty

    email.indexOf("@") == -1) {   // email lacks '@'



    return mapping.findForward(FAILURE);

}
```

At this stage, the execute method should look as follows:

```
public ActionForward execute(ActionMapping mapping, ActionForm form,

        HttpServletRequest request, HttpServletResponse response)

        throws Exception {



    // extract user data

    LoginForm formBean = (LoginForm) form;

    String name = formBean.getName();

    String email = formBean.getEmail();



    // perform validation

    if ((name == null) || // name parameter does not exist

            email == null || // email parameter does not exist

            name.equals("") || // name parameter is empty

            email.indexOf("@") == -1) {   // email lacks '@'
        return mapping.findForward(FAILURE);

    }



    return mapping.findForward(SUCCESS);

}
```

1. Add a declaration for FAILURE to the LoginAction class (changes in **bold**):

```
private final static String SUCCESS = "success";

*private final static String FAILURE = "failure";*
```

Using the above logic, the execute method forwards the request to the success view if the user provides an entry for both name and email fields, and the email entered contains an '@' sign. Otherwise, the failure view is forwarded. As will be demonstrated below in Adding forward Entries to struts-config.xml, you can set the failure view to point back to the form page, so that the user has another chance to enter data in the correct format.

Setting Up an Error Message

If the login form is returned, it would be good to inform the user that validation failed. You can accomplish this by adding an error field in the form bean, and an appropriate <bean:write> tag to the form in login.jsp. Finally, in the Action object, set the error message to be displayed in the event that the failure view is chosen.

1. Open LoginForm and add an error field to the class:

```
// error message

private String error;
```

1. Add a getter method and a setter method for error, as demonstrated above.
2. Modify the setter method so that it appears as follows:

```
public void setError() {

    this.error =

        "<span style='color:red'>Please provide valid entries for both fields</span>";

}
```

1. Open login.jsp and make the following changes:

```
<html:form action="/login">

    <table border="0">

        <tbody>

            *<tr>

                <td colspan="2">

                    <bean:write name="LoginForm" property="error" filter="false"/>

                    &amp;nbsp;</td>

            </tr>*

            <tr>

                <td>Enter your name:</td>

                <td><html:text property="name" /></td>

            </tr>
```

1. In LoginAction, within the if conditional clause, add a statement to set the error message before forwarding the failure condition (changes in **bold**):

```
if ((name == null) ||             // name parameter does not exist

    email == null  ||             // email parameter does not exist
    name.equals("") ||           // name parameter is empty

    email.indexOf("@") == -1) {   // email lacks '@'



    *formBean.setError();*

    return mapping.findForward(FAILURE);

}
```

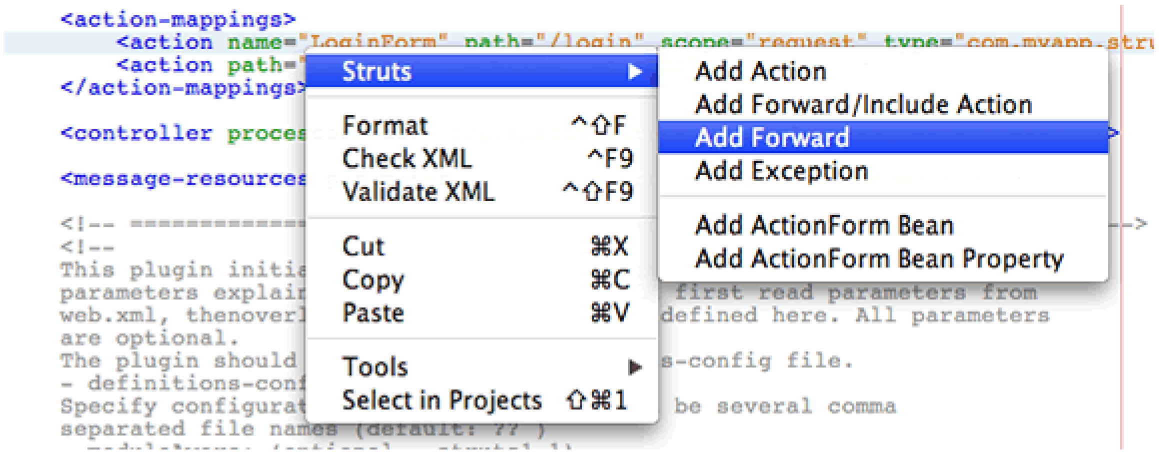
Your completed LoginAction class should now appear as follows:

```
public class LoginAction extends org.apache.struts.action.Action {



    private final static String SUCCESS = "success";

    private final static String FAILURE = "failure";



    public ActionForward execute(ActionMapping mapping, ActionForm form,

            HttpServletRequest request, HttpServletResponse response)

            throws Exception {



        // extract user data

        LoginForm formBean = (LoginForm)form;

        String name = formBean.getName();

        String email = formBean.getEmail();

        // perform validation

        if ((name == null) ||             // name parameter does not exist

           email == null  ||             // email parameter does not exist

           name.equals("") ||            // name parameter is empty

           email.indexOf("@") == -1) {   // email lacks '@'



           formBean.setError();

           return mapping.findForward(FAILURE);

        }



        return mapping.findForward(SUCCESS);



    }

}
```

Adding forward Entries to struts-config.xml

In order for the application to match JSP pages with forwarding conditions returned by LoginAction's `execute method, you need to add forward entries to the struts-config.xml file.

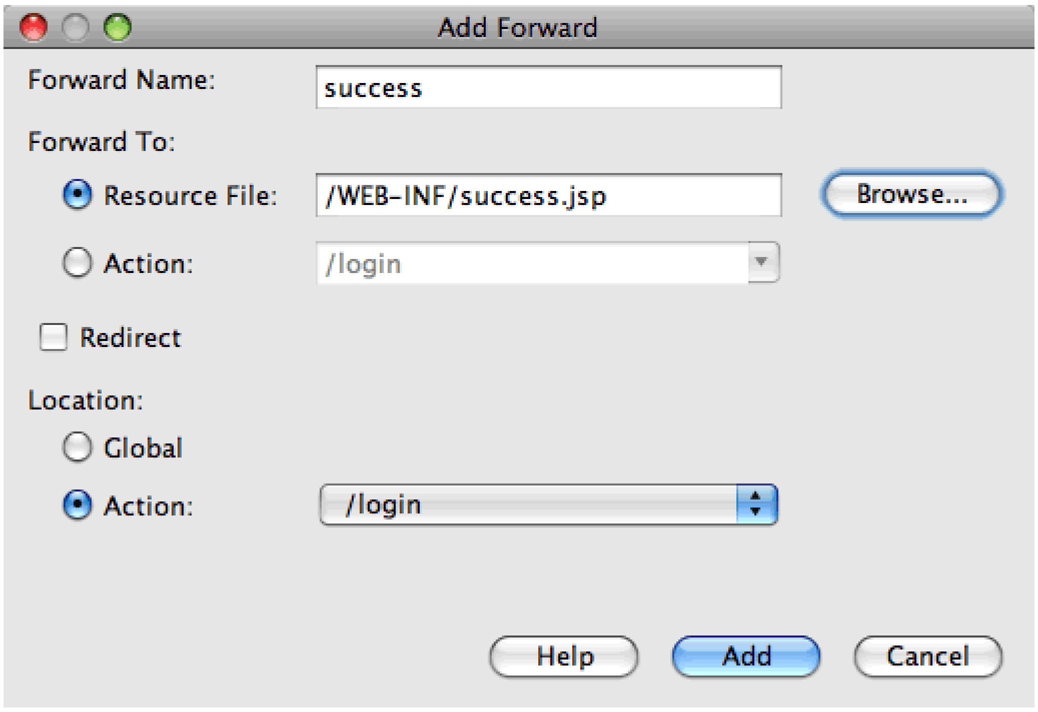
1. Open struts-config.xml in the Source Editor, right-click anywhere in the action entry for LoginForm, and choose Struts > Add Forward.



```
<action-mappings>
    <action name="LoginForm" path="/login" scope="request" type="com.myapp.stru
    <action path="
</action-mappings>

<controller proces

<message-resources

<!-- ============                                                          -->
<!--
This plugin initia                                    
parameters explair              first read parameters from
web.xml, thenoverl            defined here. All parameters
are optional.
The plugin should             s-config file.
- definitions-conf
Specify configurat              be several comma
separated file names (default: ?? )
```

Figure 10. Right-click and choose Struts > Add Forward

1. In the Add Forward dialog box, type success in Forward Name. Enter the path to success.jsp in the Resource File field (i.e., /WEB-INF/success.jsp). The dialog box should now look as follows:



Add Forward

Forward Name: success

Forward To:

(●) Resource File: /WEB-INF/success.jsp

( ) Action: /login

[ ] Redirect

Location:

( ) Global

(●) Action: /login

Figure 11. Add Forward dialog creates a forward entry in struts-config.xml

Click Add. Note that the following forward entry was added to struts-config.xml (changes in **bold**):

```
<action name="LoginForm" path="/login" scope="request"
type="com.myapp.struts.LoginAction" validate="false">

   *<forward name="success" path="/WEB-INF/success.jsp"/>*
```

```
</action>
```

1. Perform the same action to add a forward entry for failure. Set the Resource File path to /login.jsp. The following forward entry is added to struts-config.xml (changes in **bold**):

```
<forward name="success" path="/WEB-INF/success.jsp"/>

*<forward name="failure" path="/login.jsp"/>*
```

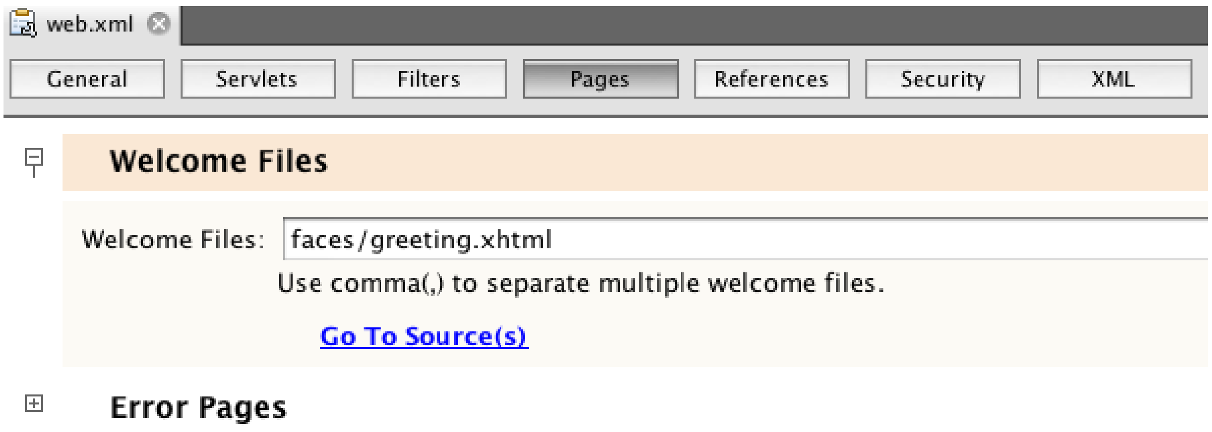
Configuring and Running the Application

The IDE uses an Ant build script to build and run your web application. The IDE generated the build script when you created the project, basing it on the options you entered in the New Project wizard. Before you build and run the application, you need to set the application's default entry point to login.jsp. Optionally, you can also add a simple stylesheet to the project.

- Setting the Welcome Page
- Attaching a Stylesheet
- Running the Application

Setting the Welcome Page

1. In the Projects window, double-click the web.xml deployment descriptor. The tabs listed along the top of the Source Editor provide you with an interface to the web.xml file. Click on the Pages tab. In the Welcome Files field, enter login.jsp.



Welcome Files: faces/greeting.xhtml
Use comma(,) to separate multiple welcome files.

Figure 12. Graphical editor for the application’s deployment descriptor

Now click on the Source tab to view the file. Note that login.jsp is now listed in the welcome-file entry:

```
<welcome-file>login.jsp</welcome-file>
```

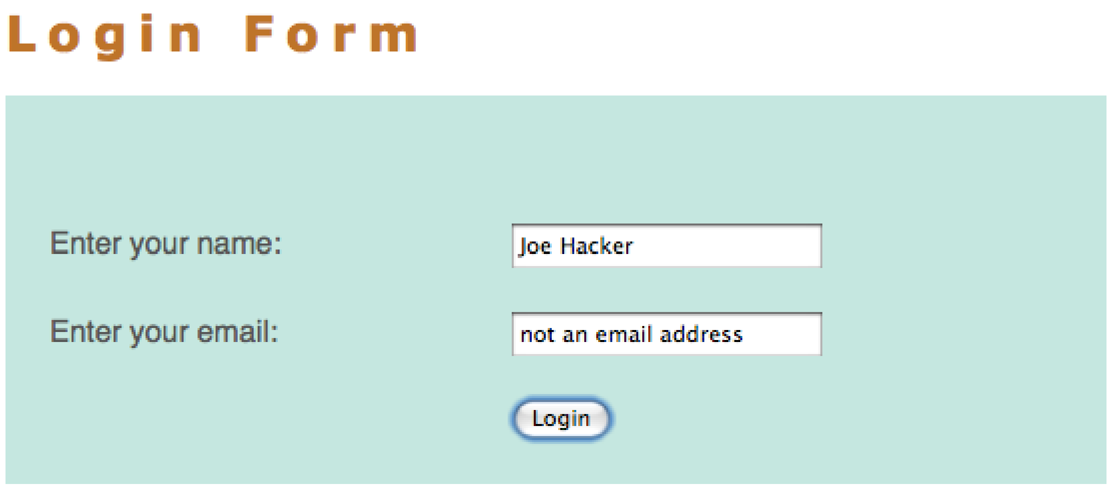
Attaching a Stylesheet

1. Add a simple stylesheet to the project. One easy way to do this is by saving this sample stylesheet to your computer. Copy the file (Ctrl-C), then in the IDE, select the Web Pages node in the Projects window and press Ctrl-V). The file is added to your project.
2. Link the stylesheet to your JSP pages by adding a reference between the <head> tags of both login.jsp and success.jsp:

```
<link rel="stylesheet" type="text/css" href="stylesheet.css">
```

Running the Application

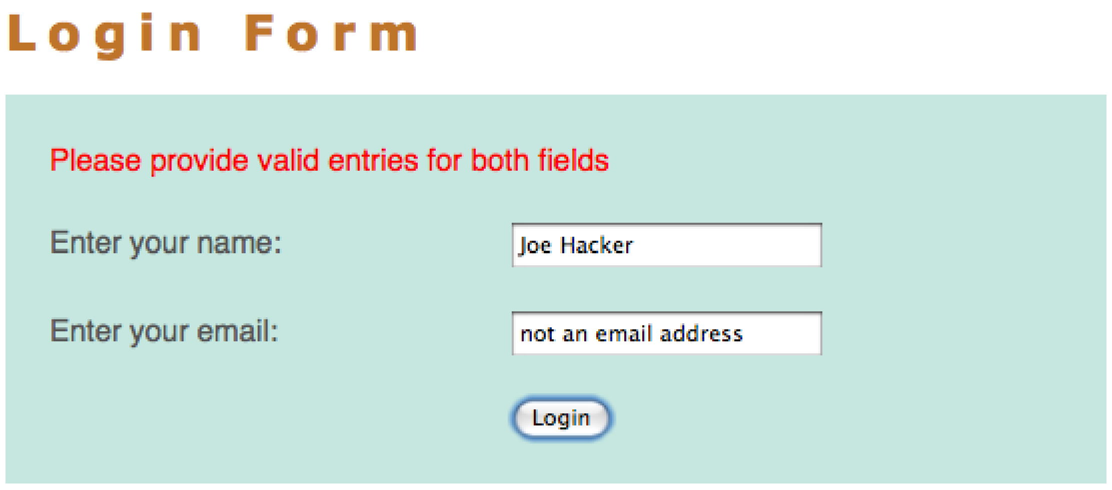
1. In the Projects window, right-click the project node and choose Run. The IDE builds the web application and deploys it, using the server you specified when creating the project. The browser opens and displays the login.jsp page. Type in some data that should fail validation, i.e., either leave either field blank, or enter an email address with a missing '@' sign:


Login Form

Enter your name:	Joe Hacker
Enter your email:	not an email address

Figure 13. Form contains data that will fail validation

When you click Login, the login form page redisplays, containing an error message:

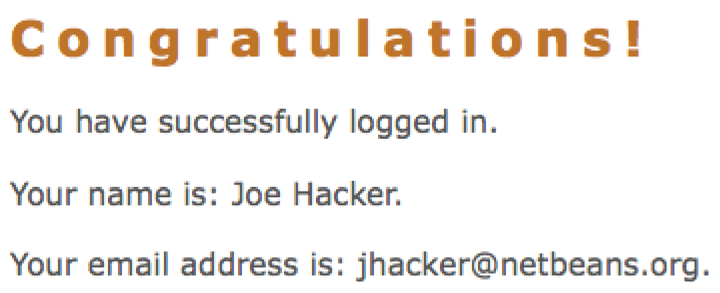

Login Form

Please provide valid entries for both fields

Enter your name:	Joe Hacker
Enter your email:	not an email address

Figure 14. Form redisplays with error message

Try entering data that should pass validation. Upon clicking Login, you are presented with the success page:


Congratulations!

You have successfully logged in.

Your name is: Joe Hacker.

Your email address is: jhacker@netbeans.org.

Figure 15. Success page displays showing input data