



# Jakarta Struts: Manually Validating Input Struts 1.2 Version

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Taught by the author of *Core Servlets and JSP*, *More Servlets and JSP*, and this tutorial. Available at public venues, or customized versions can be held on-site at your organization.

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## Overview

- **Distinguishing manual validation from automatic validation**
- **Performing validation in the Action**
  - Error messages in beans
- **Performing validation in the ActionForm**
  - Fixed error messages
  - Error messages with substitution
  - Separate error messages

## Options for Form Field Validation

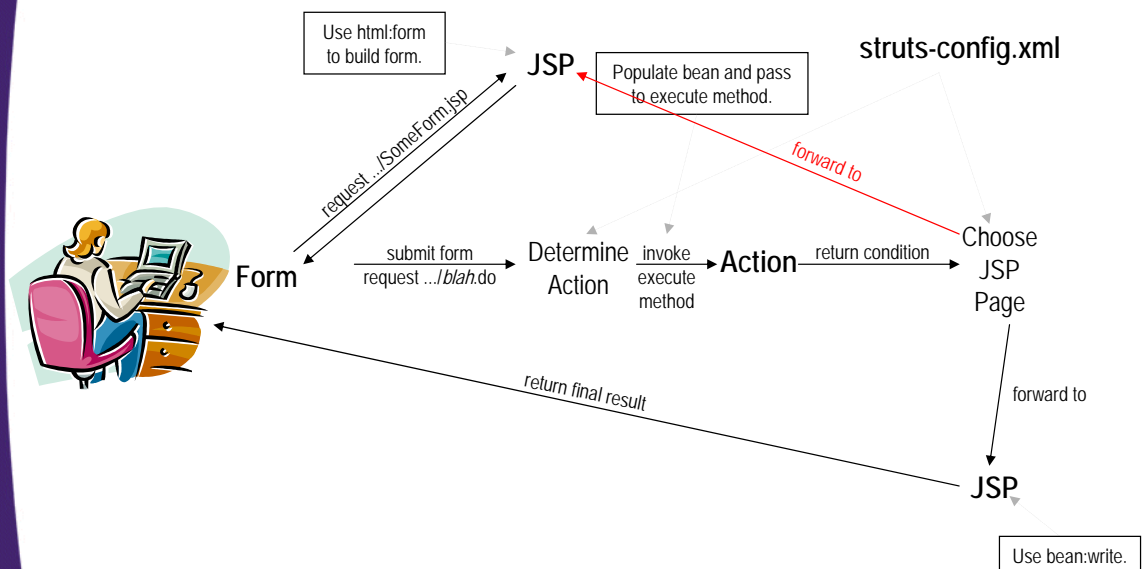
- **Do validation in the Action**
  - Most powerful; has access to business logic, DB, etc.
  - May require repetition in multiple Actions
  - Must manually map conditions back to input page
  - Must write validation rules yourself
- **Do validation in the form bean**
  - In individual setter methods
    - Not really validation, but can be used to modify values
  - Using the validate method
    - Not quite as powerful
    - Does not require repetition in multiple Actions
    - Will automatically redisplay input page
    - Still requires you to write validation rules yourself
- **Use automatic validator**
  - Handles many common cases; includes JavaScript
  - See next lecture



# Performing Validation in the Action's execute Method

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## Struts Flow of Control



## Performing Validation in the Action

- **Start normally**
  - Cast ActionForm to specific type
  - Call getter methods to retrieve field values
- **For each missing or incorrect value**
  - Add an error message to a bean
    - Using the ActionForm bean is easiest
  - Use mapping.findForward to return error code
- **Use struts-config.xml to map the error code back to the input form**
- **Use bean:write to output error messages in input form**
  - Use filter="false" if error messages contain HTML tags

## Example: Choosing Colors and Font Sizes for Resume

- **Input form**
  - Collects three font sizes (title, heading, body)
  - Collects two colors (foreground, background)
  - Uses bean:write to print out error messages
    - Error messages are empty strings by default
    - Remember the taglib entry for the "bean" library
- **ActionForm**
  - Represents form data
  - No error checking
  - Contains extra field for storing error messages
- **Action**
  - execute method checks if any params are missing. If so:
    - Returns error code
    - Puts warning message in form bean
- **struts-config.xml**
  - Maps error code back to input form

## Example: Input Form

```
<CENTER>
<%@ taglib uri="http://struts.apache.org/tags-html"
      prefix="html" %>
<%@ taglib uri="http://struts.apache.org/tags-bean"
      prefix="bean" %>
<html:form action="/actions/showSample">
  <bean:write name="formatFormBean"
              property="warning" filter="false"/><BR>
  Title size: <html:text property="titleSize"/><BR>
  Heading size: <html:text property="headingSize"/><BR>
  Body text size: <html:text property="bodySize"/><BR>
  Background color: <html:text property="bgColor"/><BR>
  Foreground color: <html:text property="fgColor"/><BR>
  <html:submit value="Show Sample"/>
</html:form>
</CENTER>
```

## Example: ActionForm

```
package coreservlets;
import org.apache.struts.action.*;

public class FormatFormBean extends ActionForm {
  private String titleSize = "";
  private String headingSize = "";
  private String bodySize = "";
  private String bgColor = "";
  private String fgColor = "";
  private String warning = "";

  public String getTitleSize() {
    return(titleSize);
  }

  public void setTitleSize(String titleSize) {
    this.titleSize = titleSize;
  }
  ...
}
```

## Example: ActionForm (Continued)

```
public String getStyleSheet() {
    return(
        "<STYLE TYPE=\"text/css\">\n" +
        "<!--\n" +
        "H1 { font-size: " + titleSize + "px; }\n" +
        "H2 { font-size: " + headingSize + "px; }\n" +
        "BODY { font-size: " + bodySize + "px;\n" +
        "      background-color: " + bgColor + ";\n" +
        "      color: " + fgColor + "; }\n" +
        "-->\n" +
        "</STYLE>");
}
```

## Example: ActionForm (Continued)

```
public String getWarning() {
    return(warning);
}

public void addWarning(String warning) {
    this.warning =
        this.warning + "<B><FONT COLOR=RED>" +
        warning + "!</FONT></B><BR>";
}

public boolean isMissing(String value) {
    return((value == null) || (value.trim().equals("")));
}
```

## Example: Action

```
public class ShowSampleAction extends Action {
    public ActionForward execute(ActionMapping mapping,
                                ActionForm form,
                                HttpServletRequest request,
                                HttpServletResponse response)
        throws Exception {
        FormatFormBean formatBean = (FormatFormBean)form;
        ActionForward forward = mapping.findForward("success");
        if (formatBean.isMissing(formatBean.getTitleSize())) {
            formatBean.addWarning("Missing Title Size");
            forward = mapping.findForward("missing-data");
        }
        if (formatBean.isMissing(formatBean.getHeadingSize())) {
            formatBean.addWarning("Missing Heading Size");
            forward = mapping.findForward("missing-data");
        }
        ...
        return(forward);
    }
}
```

## Example: struts-config.xml

```
<struts-config>
  <form-beans>
    <form-bean name="formatFormBean"
               type="coreservlets.FormatFormBean"/>
  </form-beans>
  <action-mappings>
    <action path="/actions/showSample"
            type="coreservlets.ShowSampleAction"
            name="formatFormBean"
            scope="request">
      <forward name="success"
              path="/WEB-INF/results/sample.jsp"/>
      <forward name="missing-data"
              path="/forms/form1.jsp"/>
    </action>
  </action-mappings>
</struts-config>
```

# Result: Initial Form

Choose Format - Microsoft Internet Explorer

Address: http://localhost/chooseFormat1/forms/form1.jsp

## Choose Format

Please select the font sizes and colors that you would like used to display your resume.

Title size:

Heading size:

Body text size:

Background color:

Foreground color:

Show Sample

Done Local intranet

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# Result: Incomplete Data

Choose Format - Microsoft Internet Explorer

Address: http://localhost/chooseFormat1/action/showSample.do

## Choose Format

Please select the font sizes and colors that you would like used to display your resume.

**Missing Title Size!**  
**Missing Foreground Color!**

Title size:

Heading size: 30

Body text size: 15

Background color: YELLOW

Foreground color:

Show Sample

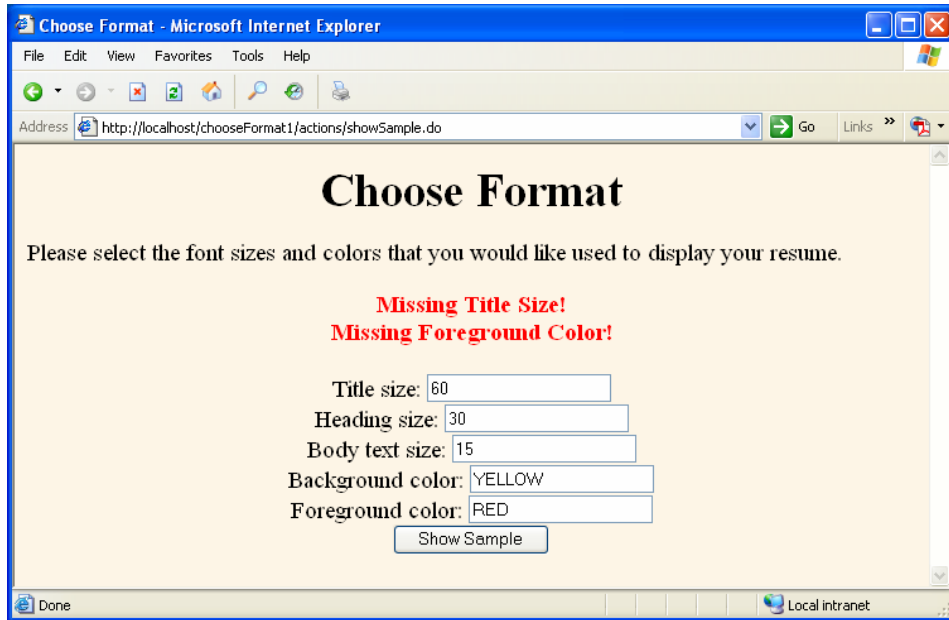
Done Local intranet

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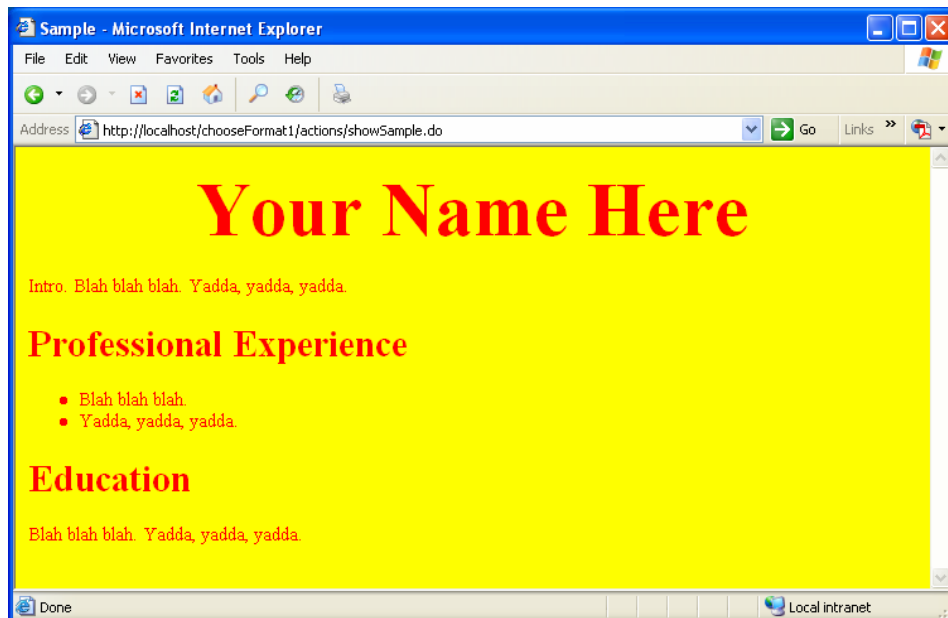
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# Result: Rentering Data



# Result: Complete Data



## Variation: Redirecting Instead of Forwarding

- In the usual scenario, the address listed by `<forward ... path="..." />` is accessed by `RequestDispatcher.forward`

```
<action path="..." type="..." name="..."
      scope="request">
  <forward name="..." path="..." />
```

  - User sees URL of Action, not of JSP page
  - Data can be request-scoped
- By specifying `redirect="true"`, you can tell the system to use `response.sendRedirect` instead

```
<action path="..." type="..." name="..."
      scope="session">
  <forward name="..." path="..." redirect="true" />
```

  - User sees URL of JSP page
  - Data must be session-scoped
  - You must clear out error messages each time

## Redirecting to Input Page

- **Advantages**
  - User sees a familiar URL
    - The one that was entered when the form was originally accessed
  - Bookmarks work normally
    - Can bookmark before or after the form is redisplayed. With forwarding, you cannot bookmark the input form once it is redisplayed (since the URL is the .do address of the Action).
  - User can hit reload on input form
- **Disadvantages**
  - Requires your data to be session-scoped
    - Per-request data like error messages must be reset each time!
    - Session data is expensive in clustered servers
  - Requires you to add entries to `struts-config.xml`
  - Does not directly correspond to other validation schemes
    - Using the `validate` method of the `ActionForm`
    - Using the automatic validation framework

# Redirecting to Input Page: Example

- **Input form**
  - Unchanged except for action address
- **Action**
  - Unchanged
- **ActionForm**
  - Added code to reset error messages each time

```
public class FormatFormBean extends ActionForm {
    ...
    public void resetWarning() {
        warning = "";
    }

    public void reset(ActionMapping mapping,
        HttpServletRequest request) {
        resetWarning();
    }
}
```

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# Redirecting to Input Page: Example (Continued)

- **struts-config.xml**

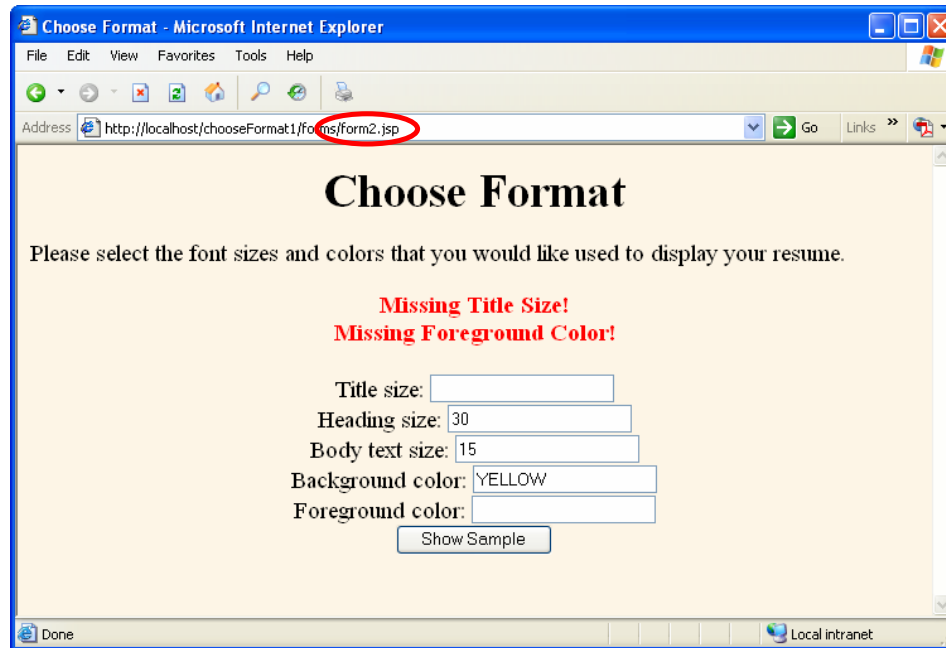
```
<action path="/actions/showSample2"
        type="coreservlets.ShowSampleAction"
        name="formatFormBean"
        scope="session">
    <forward name="success"
        path="/WEB-INF/results/sample.jsp"/>
    <forward name="missing-data"
        path="/forms/form2.jsp"
        redirect="true"/>
</action>
```

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# Redirecting to Input Page: Example (Results)



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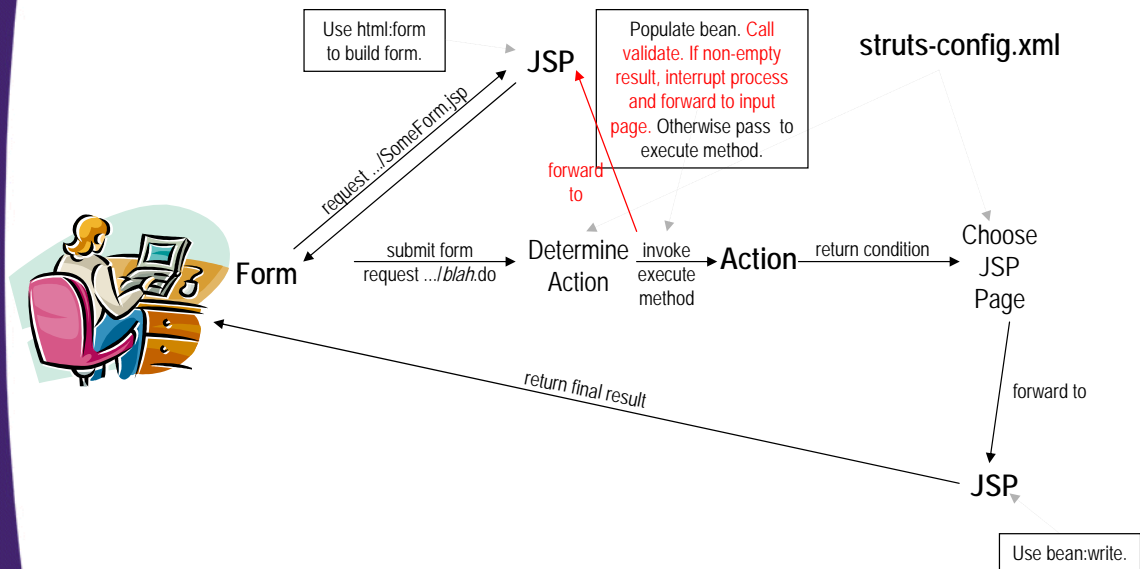
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## Performing Validation in the ActionForm's validate Method

# Struts Flow of Control



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## Performing Validation in the ActionForm

- **Create an ActionForm method called validate**
  - If no errors, return null or an empty ActionErrors object
  - For each error, add ActionMessage entries to ActionErrors
    - ActionErrors.add takes a name and an ActionMessage
    - ActionMessage constructor takes key
      - Key corresponds to entry in a property file
      - Or, supply extra value of false to supply error message directly
  - If you return a non-empty ActionErrors object, the system will automatically forward user to the input form
    - Page listed by input attribute of action in struts-config.xml
- **Create a property file with error messages**
  - Property names should match keys used in ActionMessage
  - Also define how multiple error messages are output
  - Use struts-config to declare properties file
- **Use <html:errors/> in input form**
  - Prints list of all error messages. Empty if no errors.
- **No validation logic needed in Action**

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## The validate Method

```
public ActionErrors validate(ActionMapping mapping,
                            HttpServletRequest request) {
    ActionErrors errors = new ActionErrors();
    if (isSomeProblem(getSomeProperty())) {
        errors.add("someName",
                  new ActionMessage("some.key"));
        errors.add("someOtherName",
                  new ActionMessage("actual message", false));
    }
    ...
    return(errors);
}
```

## Specifying Input Page in struts-config.xml

```
<action path="/somePath/someActionName"
        type="somePackage.SomeClass"
        name="someFormBean"
        scope="request"
        input="/somePath/original-form.jsp">
```

# Preventing Validation

- The same bean might be used with multiple actions
- What if some actions want validation to occur, and others do not?
- **Solution: specify `validate="false"` (in `struts-config.xml`) for actions that do not want validation**

– true is the default

```
<action path="..."
        type="somePackage.SomeClass"
        name="someFormBean"
        scope="request"
        input="/somePath/original-form.jsp"
        validate="false">
    <forward name="..." path"..."/>
</action>
```

# Properties File

```
# -- Standard errors --
errors.header=<UL>
errors.prefix=<LI><B><FONT COLOR="RED">
errors.suffix=</FONT></B></LI>
errors.footer=</UL>

# -- Custom validation messages --
some.key=Some Message
some.other.key=Some Other Message
```

## Example: Choosing Colors and Font Sizes for Resume (Take 2)

- **Input form**
  - Collects three font sizes (title, heading, body)
  - Collects two colors (foreground, background)
  - Uses `<html:errors/>` to print out error messages
    - Error message list is empty by default
- **ActionForm**
  - Represents form data
  - The `validate` method checks if any params are missing. If so:
    - Creates `ActionMessage` keyed to name from properties file
    - Adds `ActionMessage` to the `ActionErrors` that is returned
- **Action**
  - No validation code
- **struts-config.xml**
  - Lists path to input form

## Example: ActionForm

```
package coreservlets;

import javax.servlet.http.*;
import org.apache.struts.action.*;

public class FormatFormBean extends ActionForm {
    private String titleSize = "";
    private String headingSize = "";
    private String bodySize = "";
    private String bgColor = "";
    private String fgColor = "";

    public String getTitleSize() {
        return(titleSize);
    }

    public void setTitleSize(String titleSize) {
        this.titleSize = titleSize;
    }
    ...
}
```

## Example: ActionForm (Continued: validate method)

```
public ActionErrors validate(ActionMapping mapping,
                             HttpServletRequest request) {
    ActionErrors errors = new ActionErrors();
    if (isMissing(getTitleSize())) {
        errors.add("title",
                  new ActionMessage("titleSize.required"));
    }
    if (isMissing(getHeadingSize())) {
        errors.add("heading",
                  new ActionMessage("headingSize.required"));
    }
    ...

    if (isMissing(getFgColor())) {
        errors.add("fg",
                  new ActionMessage("fgColor.required"));
    } else if (getFgColor().equals(getBgColor())) {
        errors.add("fg",
                  new ActionMessage("colors.notMatch"));
    }
    return(errors);
}
```

## Example: Properties File (WEB-INF/classes/MessageResources.properties)

```
# -- Standard errors --
errors.header=<UL>
errors.prefix=<LI><B><FONT COLOR="RED">
errors.suffix=</FONT></B></LI>
errors.footer=</UL>

# -- Custom validation messages --
titleSize.required=Title size required.
headingSize.required=Heading size required.
bodySize.required=Body text size required.
bgColor.required=Background color required.
fgColor.required=Foreground color required.
colors.notMatch=Foreground and background
                  colors must be different.
```

## Example: struts-config.xml

```
<struts-config>
  <form-beans>
    <form-bean name="formatFormBean"
              type="coreservlets.FormatFormBean"/>
  </form-beans>
  <action-mappings>
    <action path="/actions/showSample"
           type="coreservlets.ShowSampleAction"
           name="formatFormBean"
           scope="request"
           input="/forms/index.jsp">
      <forward name="success"
              path="/WEB-INF/results/sample.jsp"/>
    </action>
  </action-mappings>
  <message-resources parameter="MessageResources"
                    null="false"/>
</struts-config>
```

## Example: Input Form

```
...
<CENTER>
<%@ taglib uri="http://struts.apache.org/tags-html"
         prefix="html" %>
<html:errors/>
<html:form action="/actions/showSample">
  Title size: <html:text property="titleSize"/><BR>
  Heading size: <html:text property="headingSize"/><BR>
  Body text size: <html:text property="bodySize"/><BR>
  Background color: <html:text property="bgColor"/><BR>
  Foreground color: <html:text property="fgColor"/><BR>
  <html:submit value="Show Sample"/>
</html:form>
</CENTER>
...
```

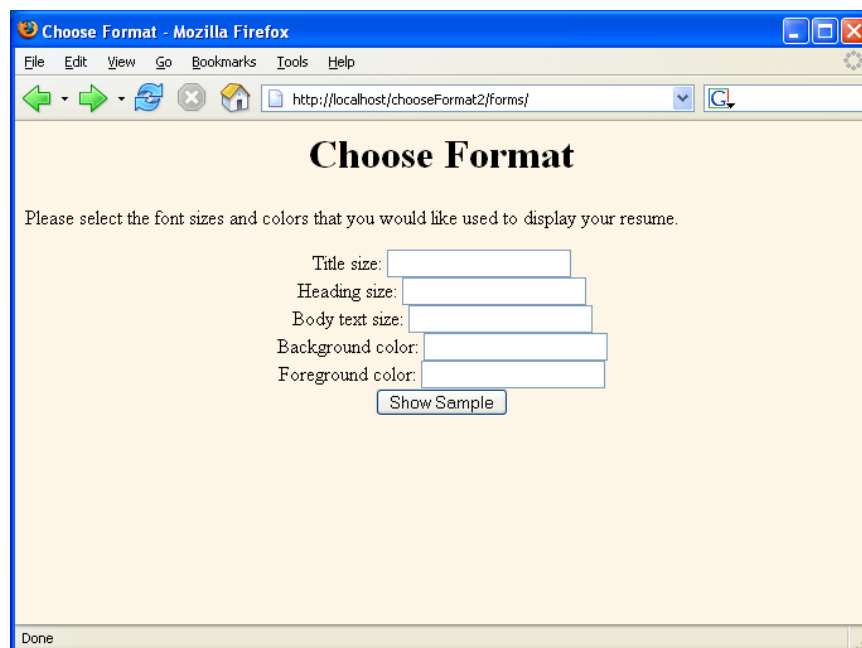
## Example: Action

```
package coreservlets;

import javax.servlet.http.*;
import org.apache.struts.action.*;

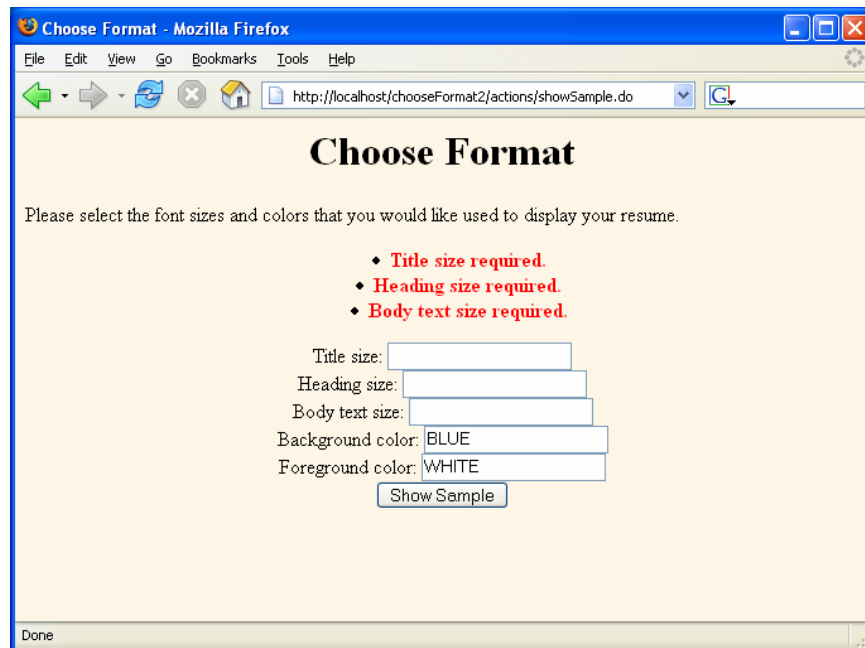
public class ShowSampleAction extends Action {
    public ActionForward execute(ActionMapping mapping,
                                ActionForm form,
                                HttpServletRequest request,
                                HttpServletResponse response)
        throws Exception {
        return(mapping.findForward("success"));
    }
}
```

## Result: Initial Form



The screenshot shows a Mozilla Firefox browser window titled "Choose Format - Mozilla Firefox". The address bar displays "http://localhost/chooseFormat2/forms/". The page content includes the heading "Choose Format" and the instruction "Please select the font sizes and colors that you would like used to display your resume." Below this, there are five input fields: "Title size:", "Heading size:", "Body text size:", "Background color:", and "Foreground color:". A "Show Sample" button is located below the "Foreground color" field. The browser's status bar at the bottom shows "Done".

# Result: Incomplete Data



Choose Format - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://localhost/chooseFormat2/actions/showSample.do

## Choose Format

Please select the font sizes and colors that you would like used to display your resume.

- Title size required.
- Heading size required.
- Body text size required.

Title size:

Heading size:

Body text size:

Background color: BLUE

Foreground color: WHITE

Show Sample

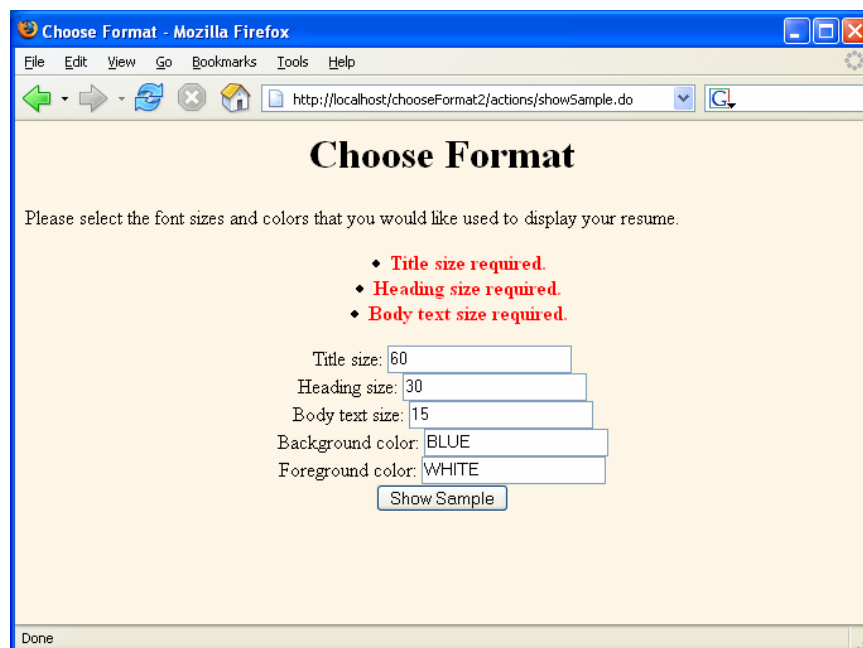
Done

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# Result: Rentering Data



Choose Format - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://localhost/chooseFormat2/actions/showSample.do

## Choose Format

Please select the font sizes and colors that you would like used to display your resume.

- Title size required.
- Heading size required.
- Body text size required.

Title size: 60

Heading size: 30

Body text size: 15

Background color: BLUE

Foreground color: WHITE

Show Sample

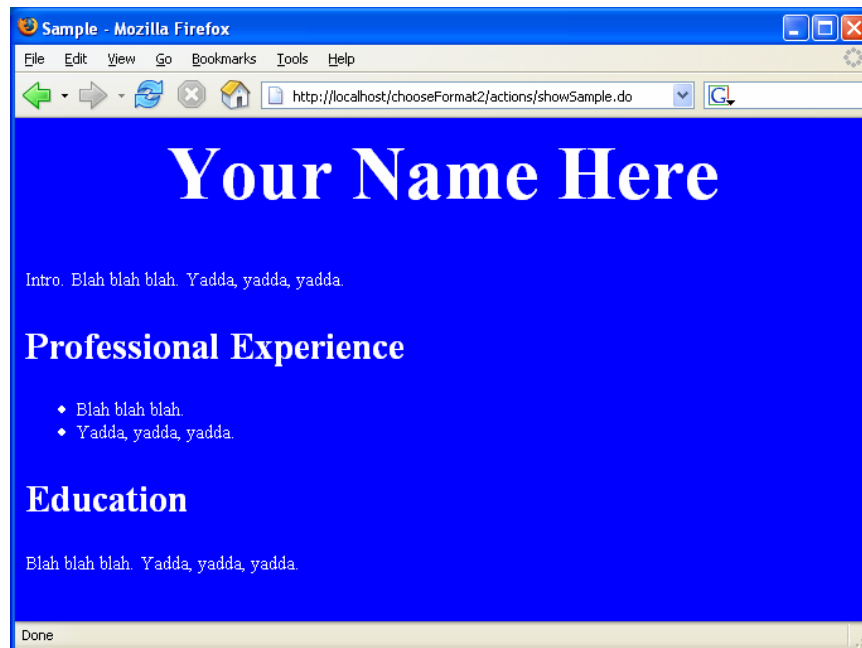
Done

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# Result: Complete Data



# Using Parameterized Error Messages

- **Benefits**
  - Error messages reflect runtime values
  - Less repetition of error messages
  - More meaningful error messages for situations other than missing-data
- **Properties file**
  - Insert placeholders for values with {0}, {1}, etc.
  - E.g.: `value.required={0}` is required.
- **ActionForm**
  - Add extra arguments to `ActionMessage` constructor
    - One argument for each placeholder
    - Up to four separate arguments allowed
      - If more arguments needed, supply an array
  - Perform more complex validation (types of arguments, relationship among values, etc.)

## Example: ActionForm (FormatFormBean)

```
...
public ActionErrors validate(ActionMapping mapping,
                             HttpServletRequest request) {
    ActionErrors errors = new ActionErrors();
    if (isMissing(getTitleSize())) {
        errors.add("titleSizeMissing",
                  new ActionMessage("value.required",
                                     "Title size"));
    } else if (!isInt(getTitleSize())) {
        errors.add("titleNotInt",
                  new ActionMessage("value.int",
                                     "title size",
                                     getTitleSize()));
    }
    ...
    if (isMissing(getFgColor())) {
        errors.add("fgColorMissing",
                  new ActionMessage("value.required",
                                     "Foreground color"));
    } else if (getBgColor().equals(getFgColor())) {
        errors.add("colorsIdentical",
                  new ActionMessage("colors.match",
                                     getBgColor()));
    }
    return(errors);
}
}
```

## Example: ActionForm (Continued)

```
private boolean isMissing(String value) {
    return((value == null) || (value.trim().equals("")));
}

private boolean isInt(String potentialInt) {
    boolean isInt = true;
    try {
        int x = Integer.parseInt(potentialInt);
    } catch(NumberFormatException nfe) {
        isInt = false;
    }
    return(isInt);
}
```

## Example: Properties File (WEB-INF/classes/MessageResources.properties)

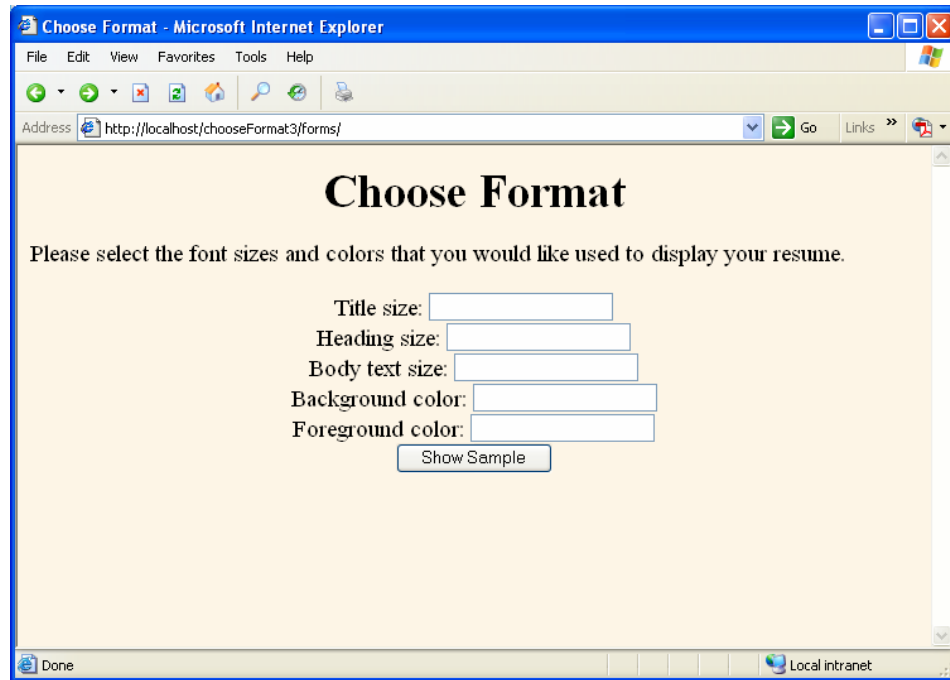
```
# -- Standard errors --
errors.header=<UL>
errors.prefix=<LI><B><FONT COLOR="RED">
errors.suffix=</FONT></B></LI>
errors.footer=</UL>

# -- Custom validation messages --
value.required={0} is required.
value.int=Whole number required for {0}; "{1}"
           is not an integer.
colors.match=The foreground and background color
              are both "{0}".
```

## Unchanged Elements

- **Identical to previous example:**
  - Input form
    - Still simply uses <html:errors/>
  - Action
    - Still does not need validation logic or a special return value to indicate redisplaying the input form
  - struts-config.xml
    - Still lists the original form as the value of the input attribute of action

# Result: Initial Form



Choose Format - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://localhost/chooseFormat3/forms/> Go Links >>

## Choose Format

Please select the font sizes and colors that you would like used to display your resume.

Title size:

Heading size:

Body text size:

Background color:

Foreground color:

Show Sample

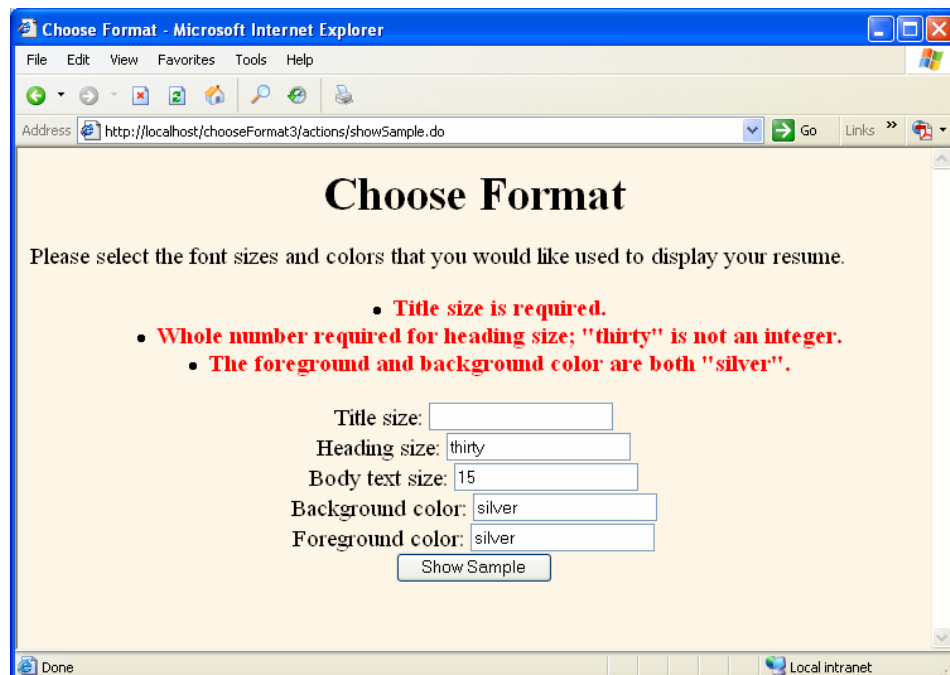
Done Local intranet

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# Result: Incomplete Data



Choose Format - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://localhost/chooseFormat3/actions/showSample.do> Go Links >>

## Choose Format

Please select the font sizes and colors that you would like used to display your resume.

- Title size is required.
- Whole number required for heading size; "thirty" is not an integer.
- The foreground and background color are both "silver".

Title size:

Heading size: thirty

Body text size: 15

Background color: silver

Foreground color: silver

Show Sample

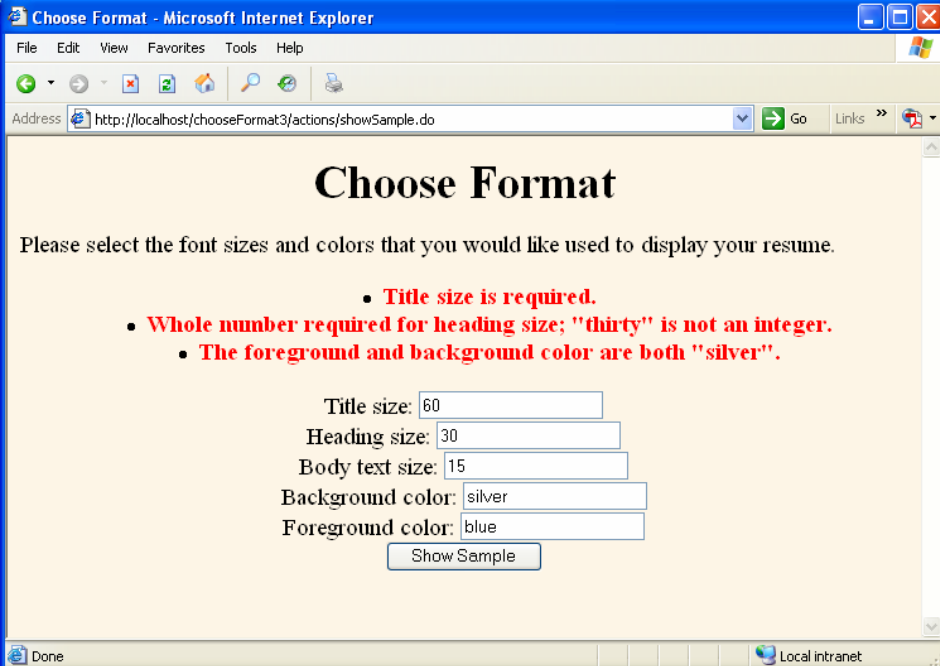
Done Local intranet

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# Result: Rentering Data



Choose Format - Microsoft Internet Explorer

Address: http://localhost/chooseFormat3/actions/showSample.do

## Choose Format

Please select the font sizes and colors that you would like used to display your resume.

- **Title size is required.**
- **Whole number required for heading size; "thirty" is not an integer.**
- **The foreground and background color are both "silver".**

Title size:

Heading size:

Body text size:

Background color:

Foreground color:

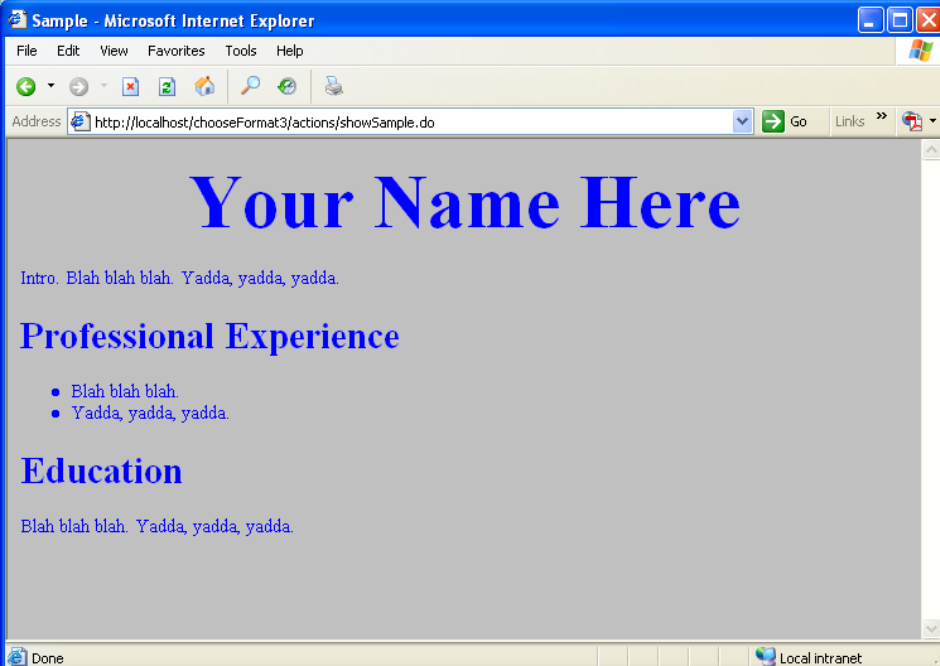
Done Local intranet

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# Result: Complete Data



Sample - Microsoft Internet Explorer

Address: http://localhost/chooseFormat3/actions/showSample.do

## Your Name Here

Intro. Blah blah blah. Yadda, yadda, yadda.

### Professional Experience

- Blah blah blah
- Yadda, yadda, yadda.

### Education

Blah blah blah. Yadda, yadda, yadda.

Done Local intranet

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## Displaying Separate Error Messages

- Instead of a list of errors, you can display separate error messages for each field
- Use `<html:errors property="name"/>`
- The name should match the name given when `ActionMessage` was created
- **Deficiency**
  - Not all warnings can be easily done with optional text
    - Turning the background color of table cells to red
    - Changing the text of a prompt

## Example: Properties File (Shorter Messages)

```
# -- Standard errors --
errors.header=
errors.prefix=<B><FONT COLOR="RED">
errors.suffix=</FONT></B>
errors.footer=

# -- Custom validation messages --
value.required={0} required.
value.int=Need int for {0}; "{1}" invalid.
colors.match=FG and BG are both "{0}".
```

## Example: ActionForm (FormatFormBean Unchanged)

```
...
public ActionErrors validate(ActionMapping mapping,
                            HttpServletRequest request) {
    ActionErrors errors = new ActionErrors();
    if (isMissing(getTitleSize())) {
        errors.add("titleSizeMissing",
                  new ActionMessage("value.required",
                                     "Title size"));
    } else if (!isInt(getTitleSize())) {
        errors.add("titleNotInt",
                  new ActionMessage("value.int",
                                     "title size",
                                     getTitleSize()));
    }
    ...
    } else if (getBgColor().equals(getFgColor())) {
        errors.add("colorsIdentical",
                  new ActionMessage("colors.match",
                                     getBgColor()));
    }
    return(errors);
}
}
```

## Example: Input Form

```
<html:form action="/actions/showSample">
<TABLE ALIGN="CENTER">
<TR><TH ALIGN="RIGHT">
    <html:errors property="titleSizeMissing"/>
    <html:errors property="titleNotInt"/>
    <TH>Title size: <html:text property="titleSize"/>
<TR><TH ALIGN="RIGHT">
    <html:errors property="headingSizeMissing"/>
    <html:errors property="headingNotInt"/>
    <TH>Heading size: <html:text property="headingSize"/>
<TR><TH ALIGN="RIGHT">
    <html:errors property="bodySizeMissing"/>
    <html:errors property="bodyNotInt"/>
    <TH>Body text size: <html:text property="bodySize"/>
<TR><TH ALIGN="RIGHT">
    <html:errors property="bgColorMissing"/>
    <html:errors property="colorsIdentical"/>
    <TH>Background color: <html:text property="bgColor"/>
<TR><TH ALIGN="RIGHT">
    <html:errors property="fgColorMissing"/>
    <TH>Foreground color: <html:text property="fgColor"/>
<TR><TH><TH><html:submit value="Show Sample"/>
</TABLE>
</html:form>
```

# Result: Initial Form

The screenshot shows a Mozilla Firefox browser window titled "Choose Format - Mozilla Firefox". The address bar contains "http://localhost/chooseFormat4/forms/". The page content includes the title "Choose Format" and a paragraph: "Please select the font sizes and colors that you would like used to display your resume." Below this are five input fields: "Title size:", "Heading size:", "Body text size:", "Background color:", and "Foreground color:". A "Show Sample" button is located below the "Foreground color" field. The status bar at the bottom of the browser window shows "Done".

# Result: Incomplete Data

The screenshot shows the same Mozilla Firefox browser window, but the address bar now contains "http://localhost/chooseFormat4/actions/showSample.do". The page content is the same as the previous screenshot, but with red text indicating validation errors: "Title size required." next to the "Title size" field, "Need int for heading size; 'thirty' invalid." next to the "Heading size" field, and "FG and BG are both 'silver'." next to the "Background color" and "Foreground color" fields. The "Show Sample" button is still present. The status bar at the bottom of the browser window shows "Done".

# Result: Rentering Data

Choose Format - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://localhost/chooseFormat4/actions/showSample.do

## Choose Format

Please select the font sizes and colors that you would like used to display your resume.

**Title size required.** Title size:

**Need int for heading size; "thirty" invalid.** Heading size:

Body text size:

**FG and BG are both "silver".** Background color:

Foreground color:

Done

# Result: Complete Data

Sample - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://localhost/chooseFormat4/actions/showSample.do

# Your Name Here

Intro. Blah blah blah. Yadda, yadda, yadda.

## Professional Experience

- Blah blah blah.
- Yadda, yadda, yadda.

## Education

Blah blah blah. Yadda, yadda, yadda.

Done

# Summary

- **Perform app-specific validation in the Action**
- **Put more reusable validation in ActionForm**
  - Return non-empty ActionErrors from validate to trigger redisplay of input form
- **Error messages are given as keys**
- **Keys match entries in properties file**
  - Possibly with parameterized substitution
- **<html:errors/> prints out error messages**
  - Usually in a list; sometimes separately
  - Empty string output if no error messages
- **Preview: automatic validation framework**
  - Writing code to check for standard cases is tedious
  - What about JavaScript?

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Apache Struts: Validating User Input Manually

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## Questions?

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