Struts

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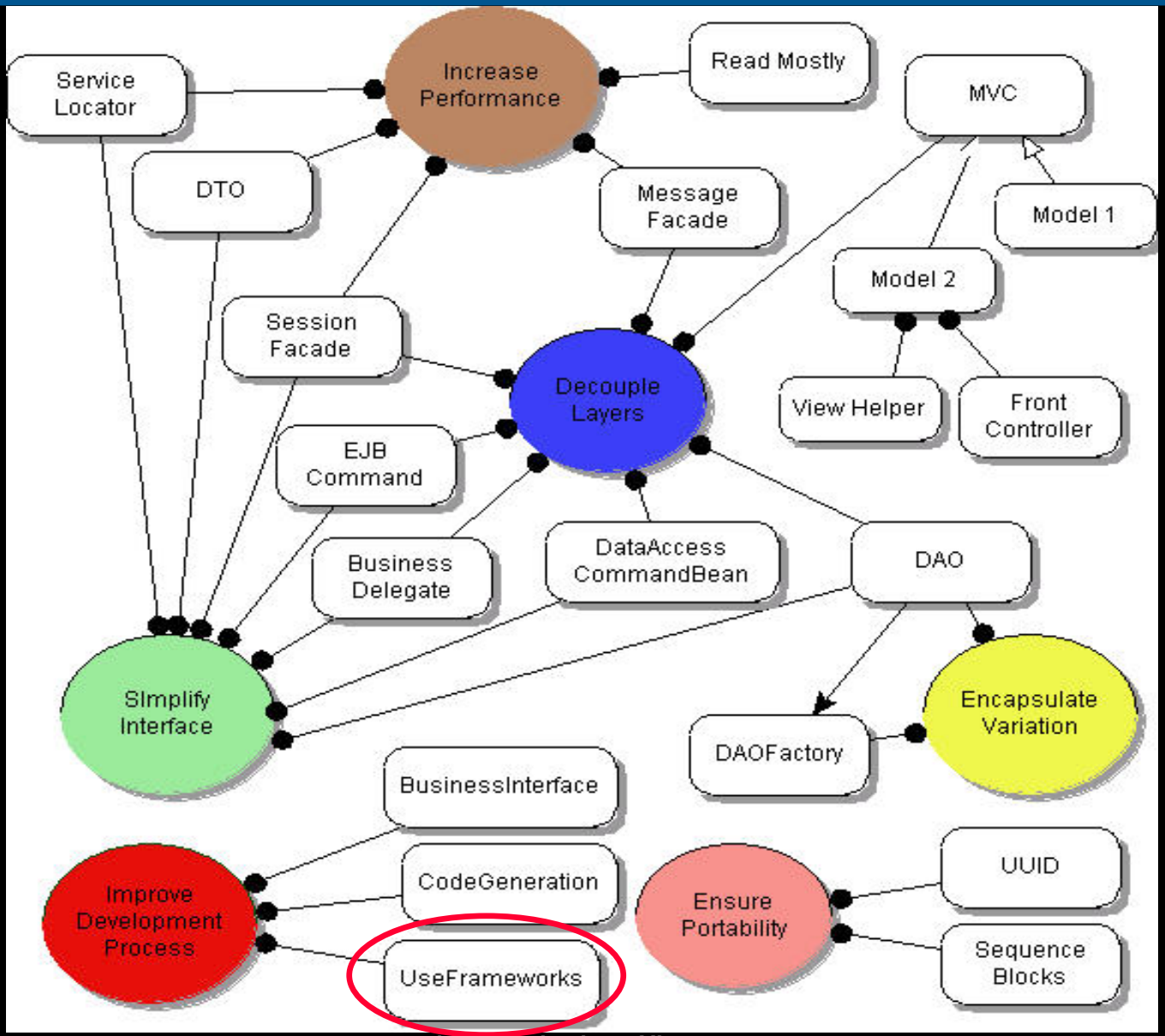
Agenda

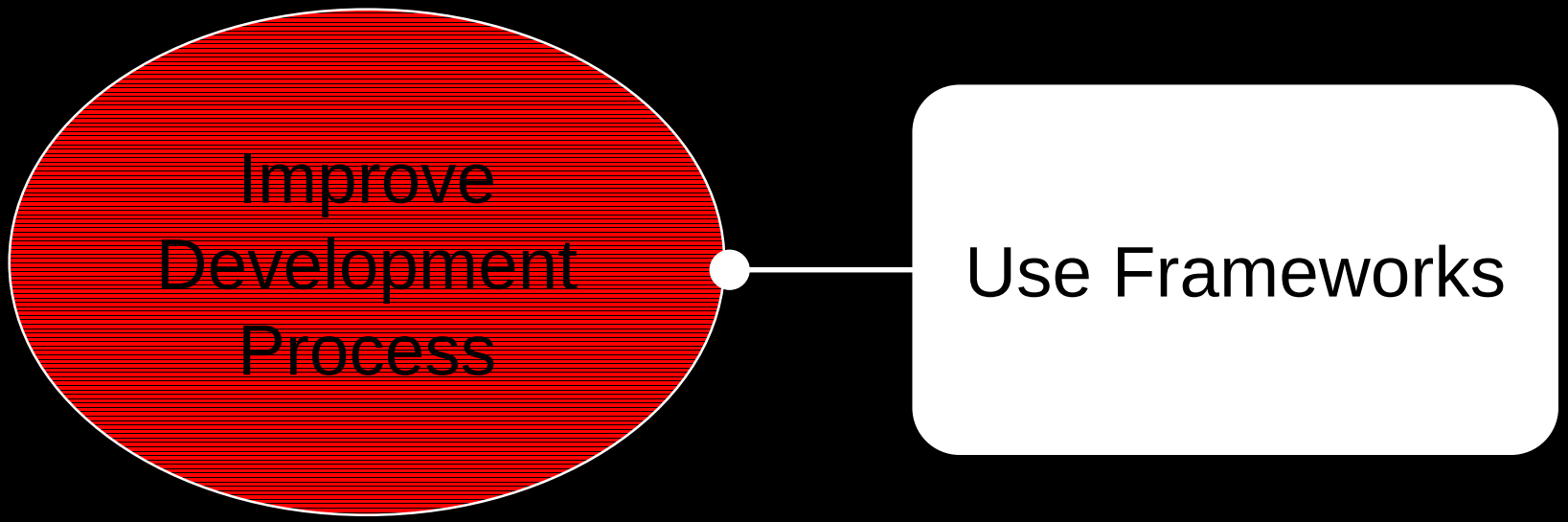
In this presentation we will discuss:

- Struts Overview
  - Where to place Struts
  - The Struts controller
  - The Struts Model
  - The Struts View
  - The structure of Struts
  - A Struts example

The Big Picture



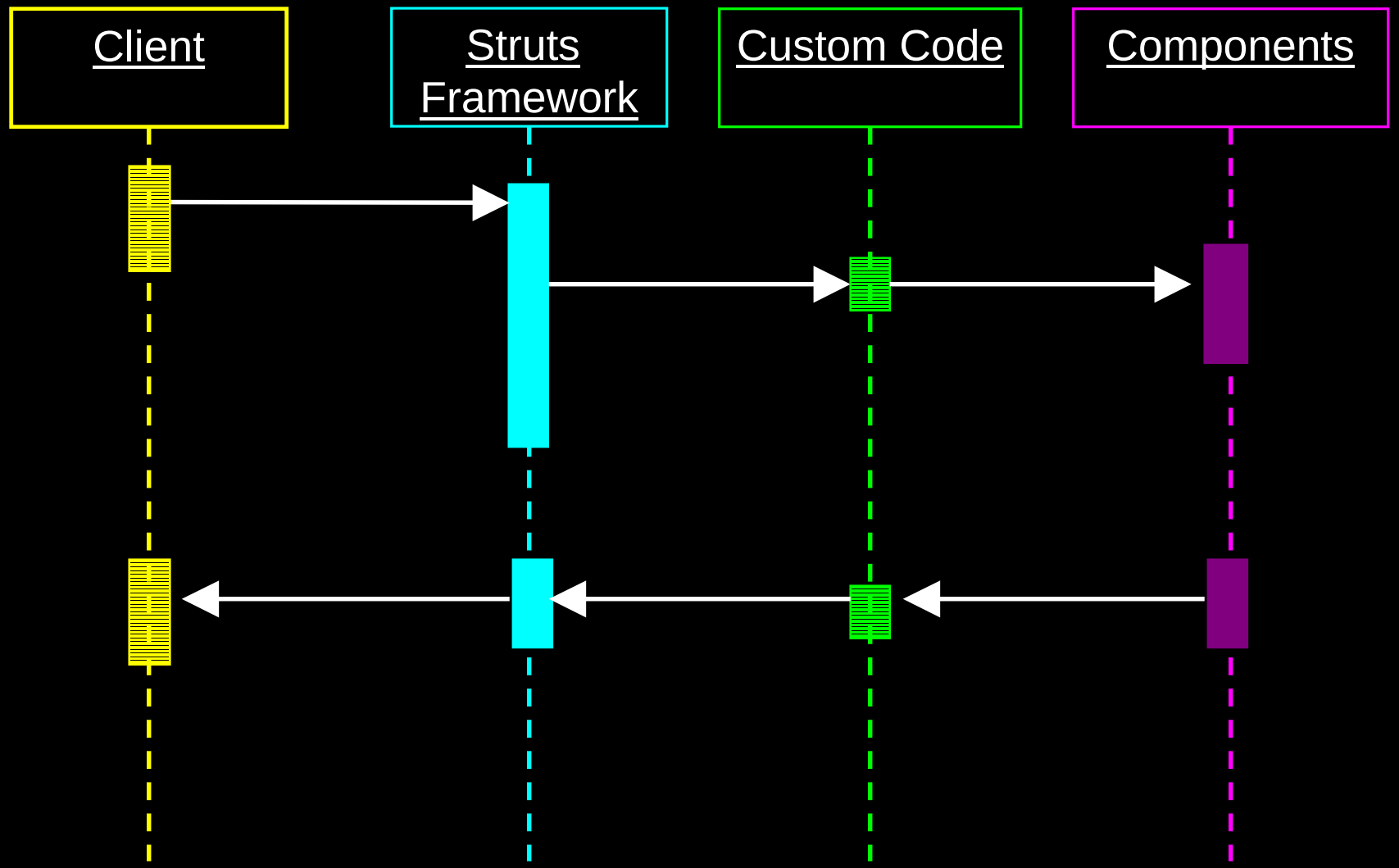
A PML View



Struts Description

- Struts is an open source framework
- Struts provides a methodology and framework enabling rapid Java web application development utilizing:
  - Service to Worker (MVC)
  - Front Controller
  - View Helper
  - DTO

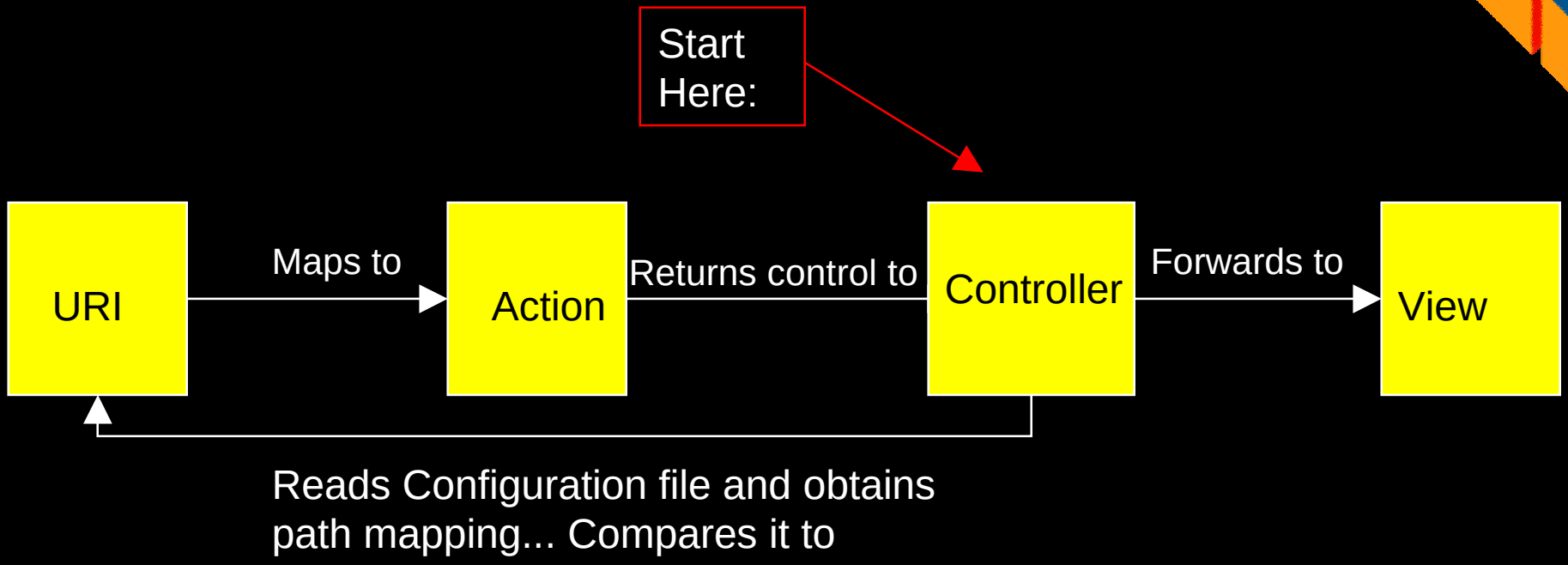
Placement of Struts



The Controller

- The Controller in Struts is embodied by
  - The ActionServlet, which serves to:
    - Parse xml configuration file provided by developer
    - Bundle and route HTTP requests to specific Action classes and JSPs as mandated by the configuration file
    - Filter the request and response behavior according to the mapping present and the results of related operations
  - Inheritors from the Struts-provided base class: Action
    - Used as Dispatchers and ViewHelpers
    - Should delegate business logic to isolated classes (POJO, SessionBeans) that do not depend upon the Struts APIs

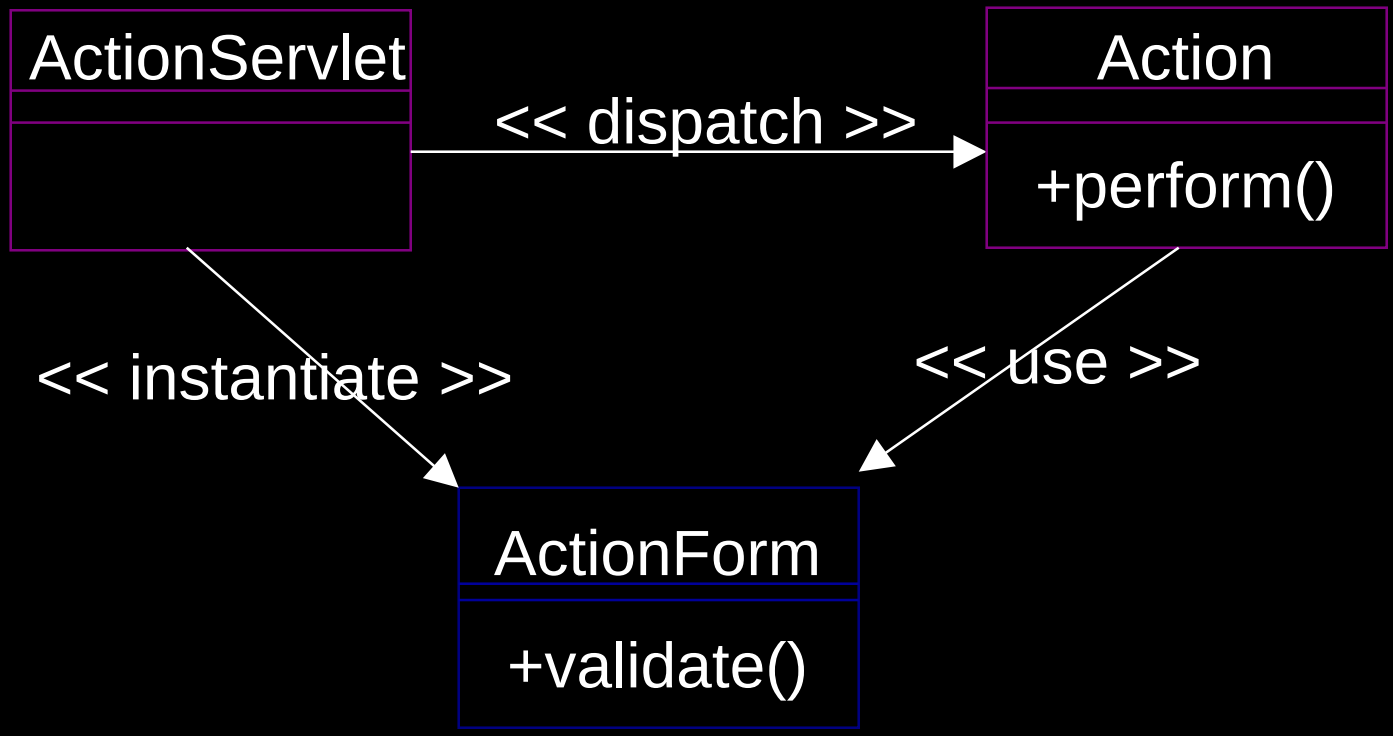
The Controller



The Model

- The Model in Struts is embodied by Java Beans and ActionForm classes
- Java Beans can be:
  - Application-specific types
  - Inheritors from the Struts provided base class: ActionForm
    - Useful for maintaining state and holding form-entry information
    - Used as ViewHelpers

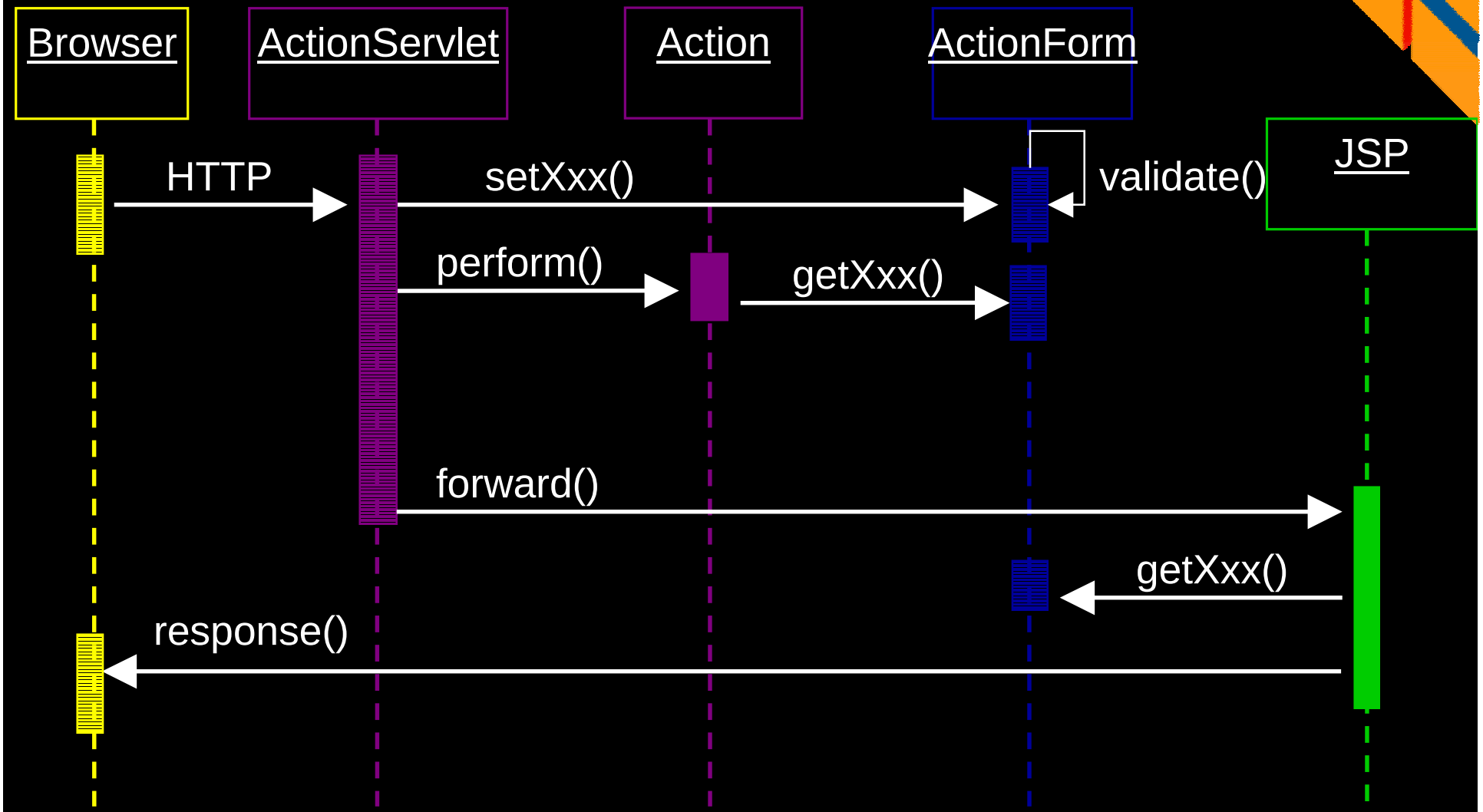
The Controller and Model



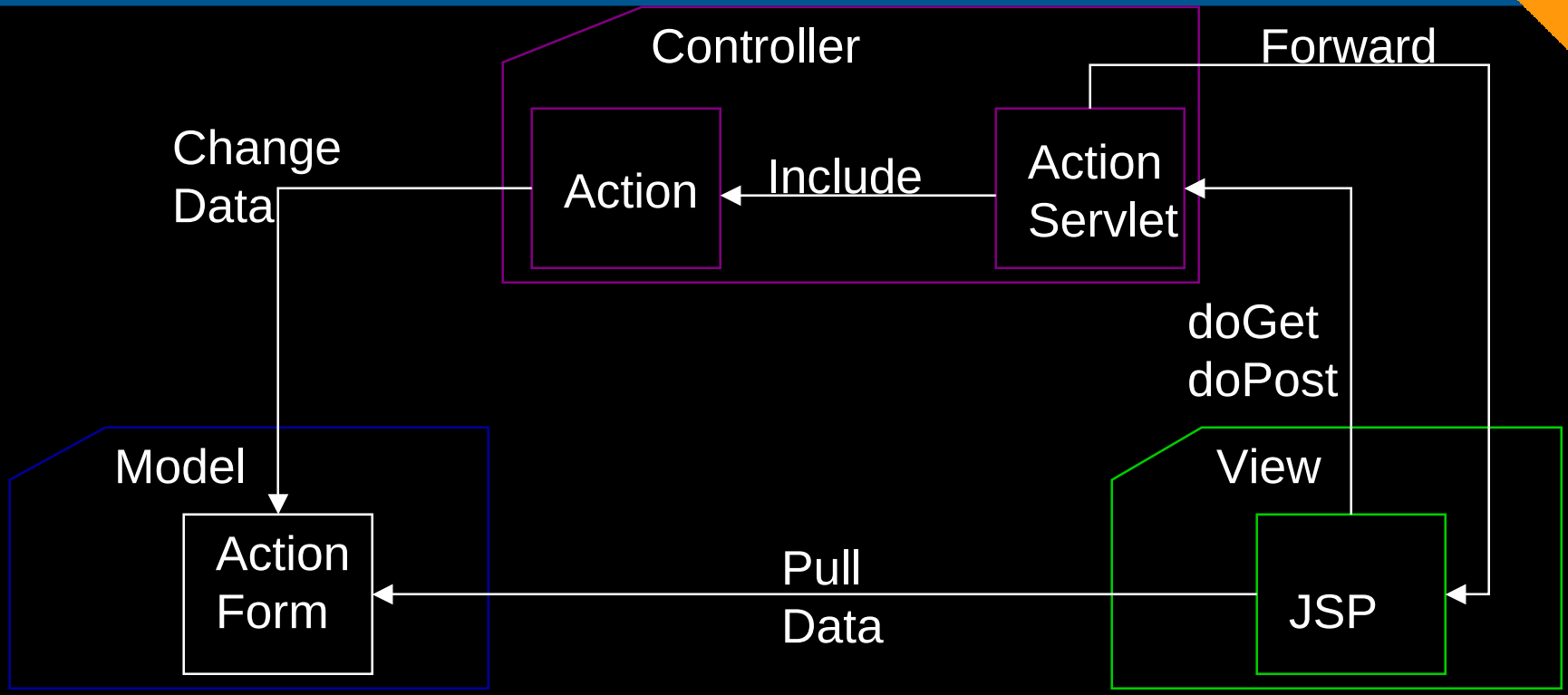
The View

- The view in Struts is embodied by both:
  - JSP pages and Servlets
  - Non-Java web resources such as XML and HTML pages
- A rich set of taglibs is associated with Struts
  - This can aid in building complex views
- Content (even field labels) can be removed from JSPs
- Struts JSPs provide formatting and error handling

Structure



Structure ...continued



Strategies: Struts Code Example

- Here we will show a simple Struts example including:
  - The Struts configuration files
  - Action Classes
  - ActionForm classes
  - JSPs utilizing struts-specific taglibs
- We will not show:
  - The Helper class that accesses the EJB layer
  - The EJBs
  - The DTOs
  - The error.jsp

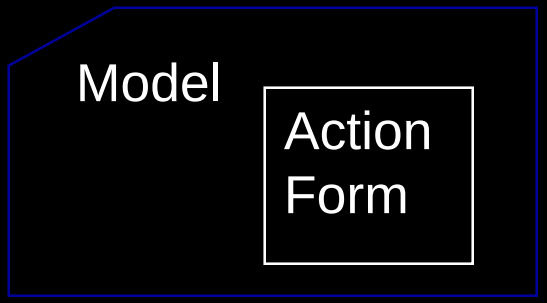
struts-config.xml


```
<?xml version="1.0" encoding="ISO-8859-1" ?>
<!DOCTYPE struts-config PUBLIC
"-//Apache Software Foundation//DTD Struts Configuration 1.0//EN"
"http://jakarta.apache.org/struts/dtds/struts-config_1_0.dtd">
<struts-config>
  <form-beans>
    <form-bean name="inventoryForm" type="com.test.InventoryForm"/>
  </form-beans>
  <action-mappings>
    <action path="/inventory"
         type="com.test.InventoryAction"
         name="inventoryForm"
         scope="request"
         input="/selectCategory.jsp">
      <forward name="error" path="/error.jsp"/>
      <forward name="success" path="/viewItems.jsp"/>
    </action>
  </action-mappings>
</struts-config>
```

ApplicationResources.properties


```
inventory.page.title=First Struts Inventory System
viewItems.page.done=That is all of the items in that category.
   <p />Thankyou for visiting!
select-category.page.heading=Greetings!
select-category.page.message=Please enter the name of the item
   category in the textfield below.  Then press submit to view
   all items belonging to that category:  (example: FRUIT)
error.inventory.itemCategory.wrong=Please enter one of these
   choices into the item category field:  FRUIT, MEAT,
   VEGETABLE
error.inventory.itemCategory.required=Please enter a value
   into the text field before clicking submit.
```

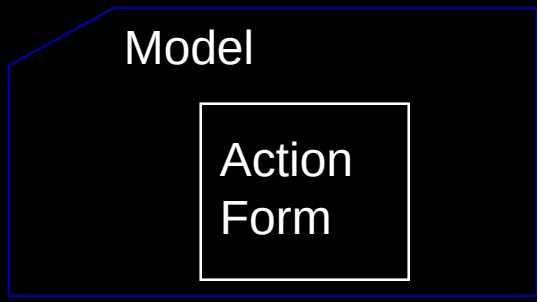
InventoryForm.java



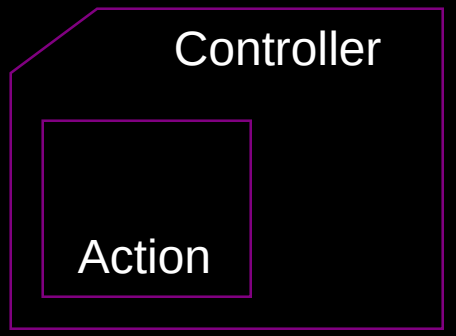

```
package com.test;

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

public final class InventoryForm extends ActionForm {
  private String itemCategory;
  private Collection items;

  public InventoryForm(){}
  public void setItems(Collection c){
    this.items = c;
  }
  public Collection getItems(){
    return items;
  }
...
```

InventoryForm.java ...continued


```
...
  public ActionErrors validate(ActionMapping mapping,
   HttpServletRequest request){
    ActionErrors errors = new ActionErrors();
    if(itemCategory == null || itemCategory.length() < 1){
      errors.add("itemCategory", new
   ActionError("error.inventory.itemCategory.required"));
    }
    else if(!
   (("FRUIT".equalsIgnoreCase(itemCategory))||("MEAT".equalsIgnoreCase
   (itemCategory))||("VEGETABLE".equalsIgnoreCase(itemCategory)))){
      errors.add("itemCategory", new
   ActionError("error.inventory.itemCategory.wrong"));
    }
    return errors;
  }
  public String getItemCategory(){
      return itemCategory;
  }
  public void setItemCategory(String itemCategory){
      this.itemCategory = itemCategory;
  }
}
```



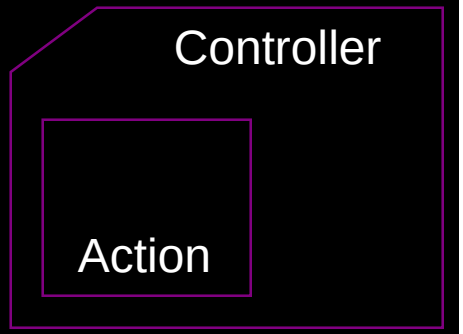
InventoryAction.java




```
package com.test;

import java.io.*;
import javax.servlet.*;
import javax.servlet.http.*;
import org.apache.struts.action.*;
import java.util.*;

public final class InventoryAction extends Action
{
  com.test.HelperBean bean=null;
  public InventoryAction(){
  }
 public ActionForward perform(ActionMapping mapping, ActionForm form,
   HttpServletRequest request, HttpServletResponse response)
    throws ServletException, IOException{
    String fwd = "success";
    ActionErrors errors = new ActionErrors();
    InventoryForm iform = (InventoryForm)form;
    Collection c = null;
...
```

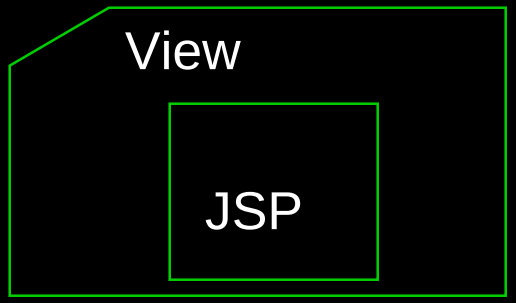
InventoryAction.java ...continued


```
    try{
      bean = new HelperBean();
      c = bean.getItemsInCategory(iform.getItemCategory());
      iform.setItems(c);
    }
    catch(DataAccessException dae){
      errors.add("org.apache.struts.action.GLOBAL_ERROR", new
   ActionError("error.inventory.page.dataAccess"));
    }
    finally{
      if(!errors.empty()){
        fwd = "error";
        return mapping.findForward(fwd);
      }
    }
    return mapping.findForward(fwd);
  }
}
```



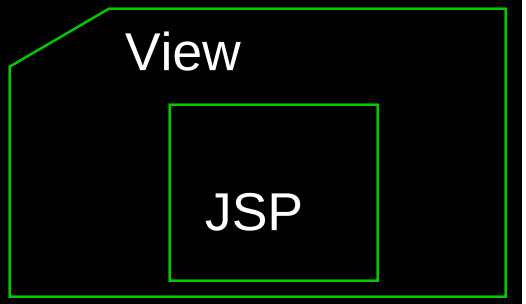
Index.Jsp

```
<jsp:forward page="SelectCategory.jsp" />
```

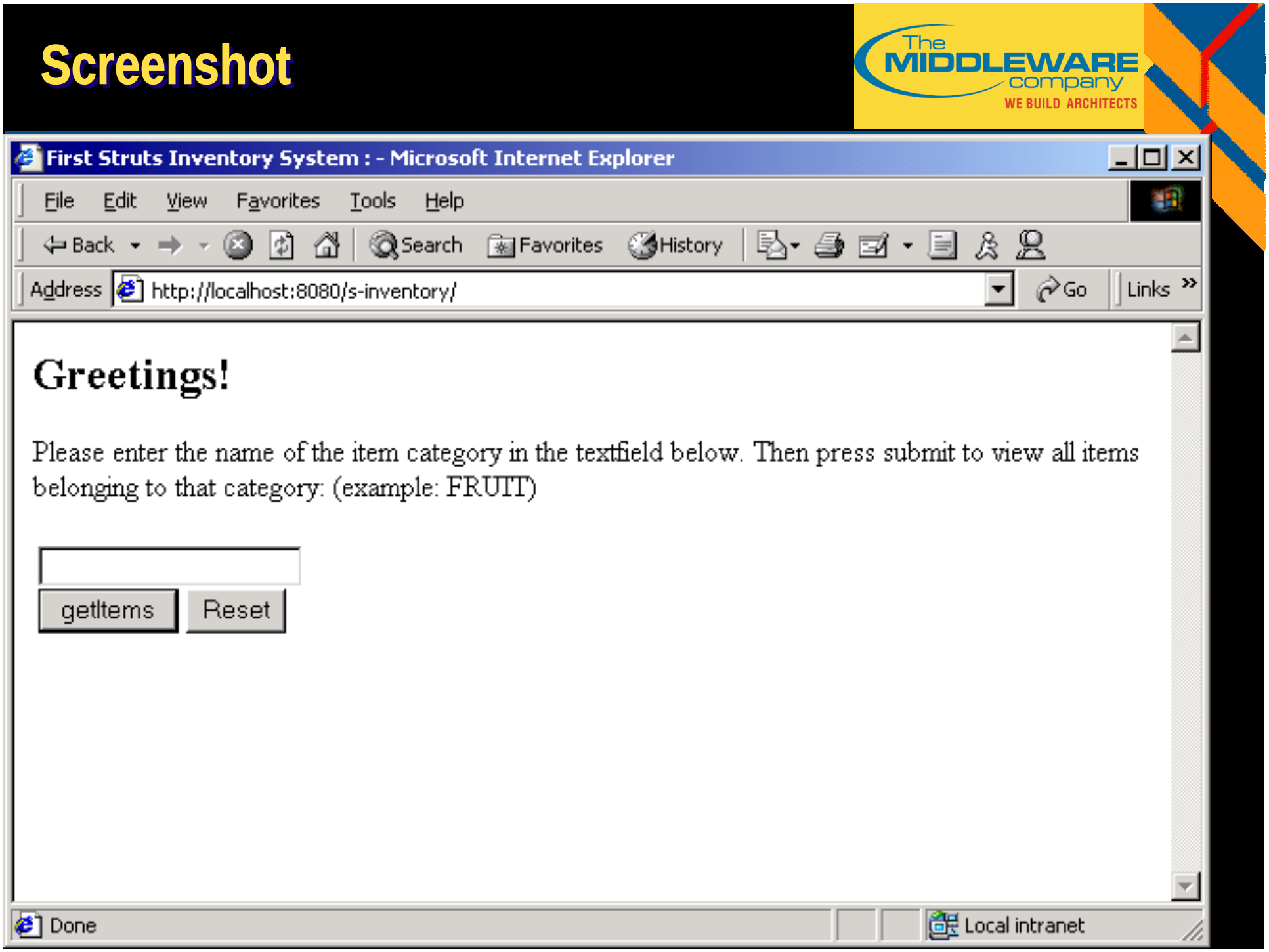


SelectCategory.jsp

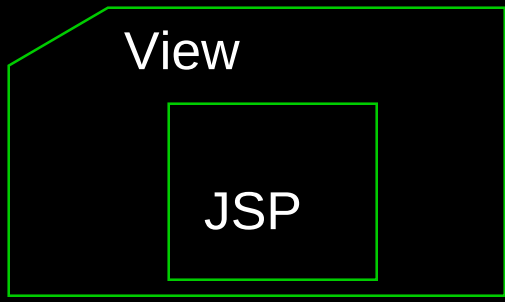
```
<%@ page language="java" %>
<%@ taglib uri="/WEB-INF/struts-bean.tld" prefix="bean" %>
<%@ taglib uri="/WEB-INF/struts-html.tld" prefix="html" %><html>
<title><bean:message key="inventory.page.title"/> :</title>
<body>
<h2><bean:message key="select-category.page.heading"/></h2><p />
<bean:message key="select-category.page.message"/>
<table  width=100%>
    <tr>
        <td colspan=2>
           <font face="arial" color="red" size=2><html:errors/></font>
               <html:form action="inventory.do" focus="itemCategory">
                    <br /><html:text property="itemCategory" /><br>
                    <html:submit value="getItems"/>
                    <html:reset/>
                </html:form>
        </td>
    </tr>
</table>
</body>
</html>
```



Screenshot

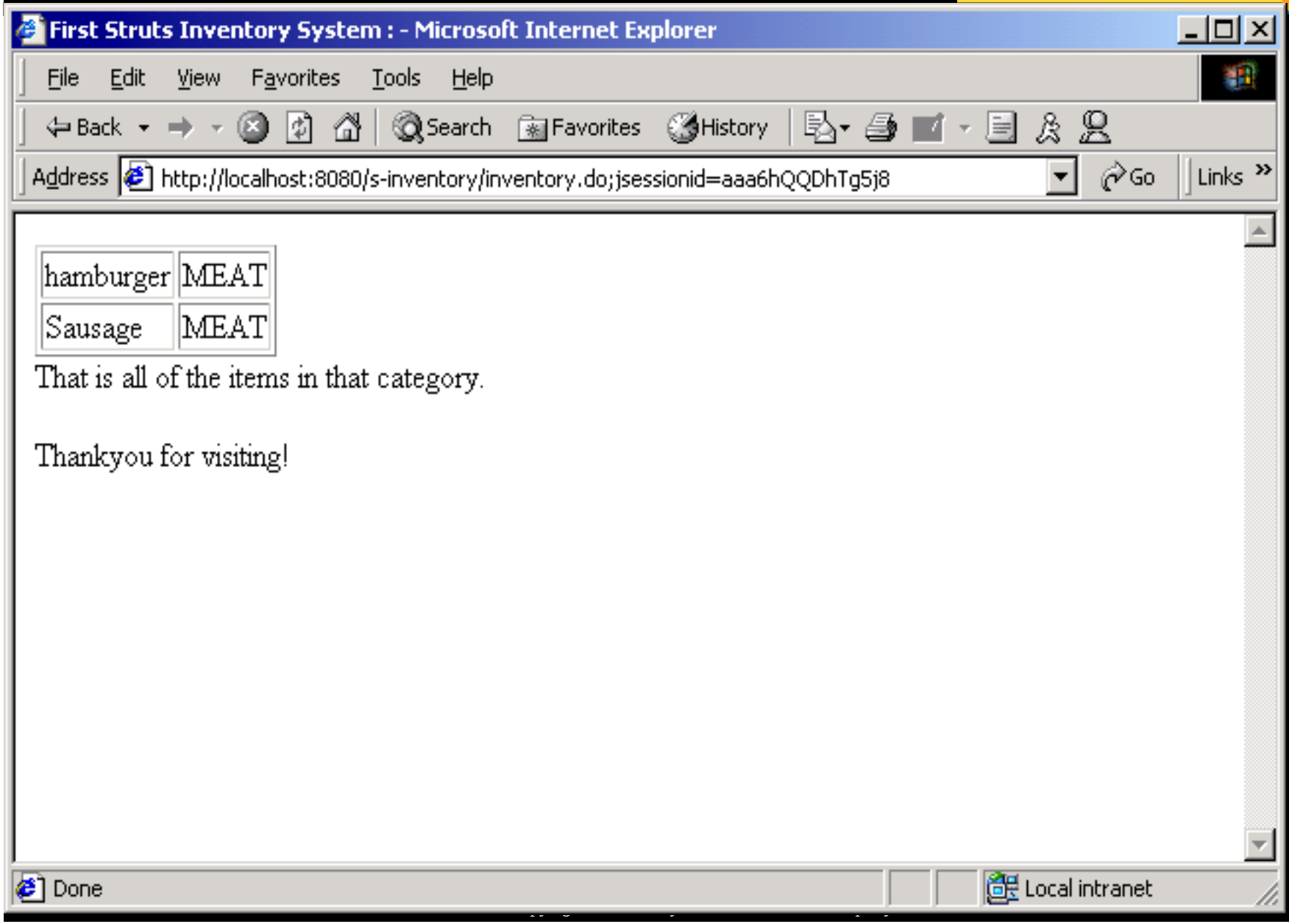

First Struts Inventory System : - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://localhost:8080/s-inventory/
Go Links
Greetings!
Please enter the name of the item category in the textfield below. Then press submit to view all items belonging to that category: (example: FRUIT)
getItems
Reset
Done
Local intranet

ViewItems.jsp




```
<%@ page language="java" %>
<%@ taglib uri="/WEB-INF/struts-bean.tld" prefix="bean" %>
<%@ taglib uri="/WEB-INF/struts-logic.tld" prefix="logic" %>
<html>
<title>
    <bean:message key="inventory.page.title"/> :
</title>
<body>
<table border="1">
     <logic:iterate id="item" name="inventoryForm" property="items"  >
       <tr>
          <td><bean:write name="item" property="itemName" /></td>
           <td><bean:write name="item" property="category" /></td>
      </tr>
      </logic:iterate >
</table>
  <bean:message key="viewItems.page.done" />
</body>
</html>
```

Screenshot


First Struts Inventory System : - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://localhost:8080/s-inventory/inventory.do;jsessionid=aaa6hQQDhTg5j8
Go Links
hamburger MEAT
Sausage MEAT
That is all of the items in that category.
Thankyou for visiting!
Done
Local intranet

Consequences

- Using any framework
  - speeds development efforts
  - helps to improve maintenance efforts on large projects
  - Requires an investment of time and training
- Open source frameworks are particularly beneficial in that
  - They do not cost anything to use
  - They are usually maintained and improved upon by a knowledgeable and motivated collection of programmers
- Struts is
  - Well established
  - Based upon existing standards
  - Helpful in separating the Model from View from Controller

Related Frameworks

- Velocity
- Sitemesh
- OSCache
- Cocoon
- Pushlets
- Tapestry
- WebWork

Summary

In this presentation we discussed:

- Struts Overview
  - Where to place Struts
  - The Struts controller
  - The Struts Model
  - The Struts View
  - The structure of Struts
  - A Struts example