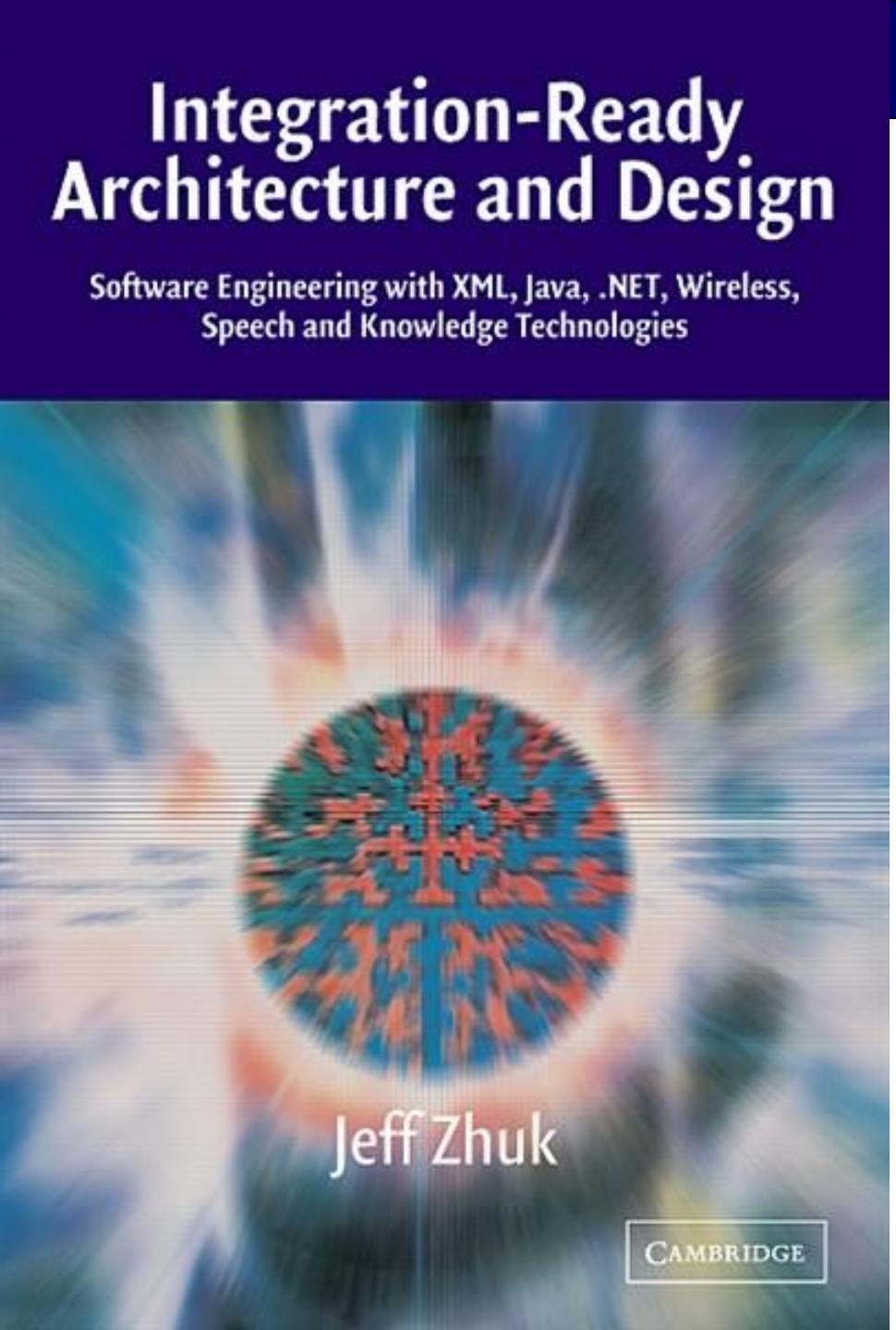

Best Software Development Practices

by Jeff Zhuk

Struts – Spring - Hibernate

DataService & Semantic Frameworks(JavaSchool.com)

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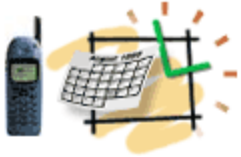

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WRITE ONCE: BUILDING REUSABLE ENTERPRISE COMPONENTS
THE NEW GENERATION OF SOFTWARE for MULTIPLE CLIENTS
J2EE DESIGN PATTERNS

FUNDAMENTALS OF WIRELESS TECHNOLOGIES
PROGRAMMING WAP APPLICATIONS
JAVACARD TECHNOLOGY AND RELATED APPLICATIONS
J2ME AND SERVER SIDE DEVELOPMENT FOR SMS AND MESSAGING

SPEECH TECHNOLOGIES FOR VOICE APPLICATIONS
AN INTRODUCTION TO KNOWLEDGE TECHNOLOGIES
DISTRIBUTED APPLICATIONS WITH JXTA FRAMEWORKS
INTEGRATION OF SOFTWARE AND KNOWLEDGE ENGINEERING

Reference book: Jeff Zhuk,
Integration-Ready Architecture and Design.
Software Engineering with XML, Java, .Net, Wireless, Speech, and Knowledge Technologies,
Cambridge University Press,
http://www.amazon.com/exec/obidos/ASIN/0521525837
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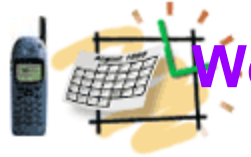

Web Applications Frameworks: Struts – Spring - Hibernate Data & Semantic Services *(JavaSchool.com)*

- **Struts is the major framework for developing Web Applications**
- Extends Servlet-Controller in a function-specific ***Action***
- Uses ***struts-config.xml file*** to define all function-actions
- Collects the data from the web forms into specific ***ActionForm*** classes that keep data state between requests
- Maps each ***Action*** to its ***ActionForm*** in the ***struts-config.xml***
- Introduces a powerful set of tag libraries
- And more…

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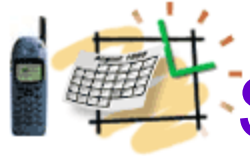
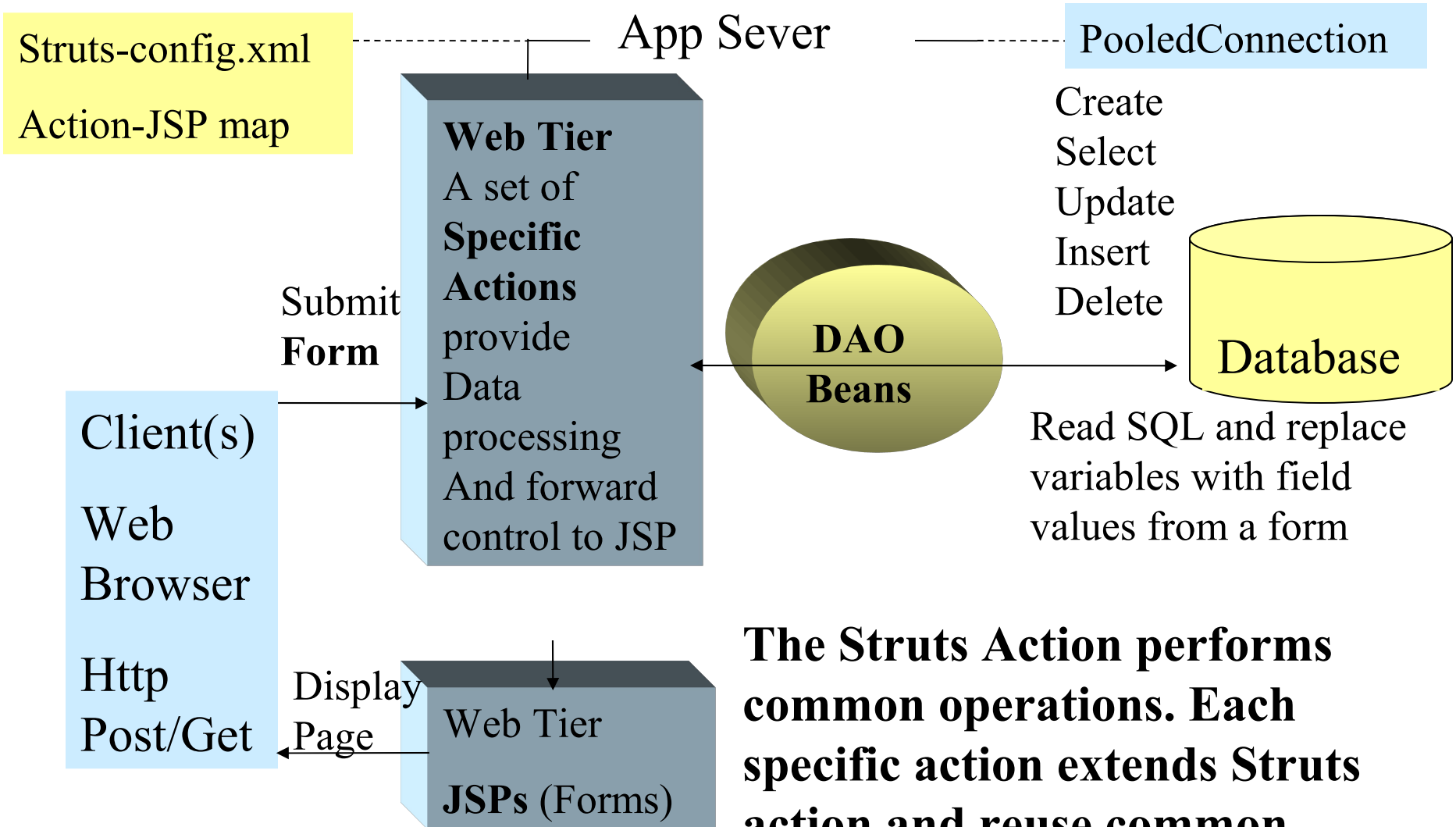


Struts Frameworks for Web Application



The Struts Action performs common operations. Each specific action extends Struts action and reuse common functionality. Usually Data Access Object (DAO) design

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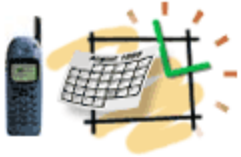

Application Parameters in the web.xml

App-name.war

- WEB-INF

- web.xml

```
<context-param>
      <param-name>ITSDataSource</param-name>
      <param-value>ITSDispDataSource</param-value>
  </context-param>

<context-param>
      <param-name>roles</param-name>
      <param-value>
Admin,Developer,Modeler,Configurator,Assembler
      </param-value>
  </context-param>
```

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Application Parameters in the web.xml

App-name.war

- WEB-INF

- web.xml

```
<!-- Standard Action Servlet Configuration -->
<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>
</servlet>
```

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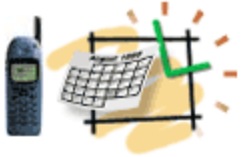

Application Parameters in the web.xml

App-name.war

- WEB-INF

- web.xml

```
<!-- Standard Action Servlet Mapping -->
<servlet-mapping>
  <servlet-name>action</servlet-name>
  <url-pattern>*.do</url-pattern>
</servlet-mapping>
```

What does this mapping mean?

You can provide a URL to *MyAction.class* as http://myServer.com:8080/MyApplicationName/*MyAction.do*

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Application Parameters in the web.xml

App-name.war

- WEB-INF

- web.xml

```
<!-- The Usual Welcome File and Error Page List -->
<welcome-file-list>
   <welcome-file>login.jsp</welcome-file>
</welcome-file-list>

 <error-page>
   <error-code>404</error-code>
   <location>/WEB-INF/jsp/DisplayActionException.jsp</location>
 </error-page>

 <error-page>
   <error-code>500</error-code>
   <location>/WEB-INF/jsp/DisplayActionException.jsp</location>
 </error-page>
```

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Struts Tag Library

```
 <!-- Struts Tag Library Descriptors -->
<taglib>
 <taglib-uri>/WEB-INF/tld/struts-bean.tld</taglib-uri>
 <taglib-location>/WEB-INF/tld/struts-bean.tld</taglib-location>
</taglib>

<taglib>
 <taglib-uri>/WEB-INF/tld/struts-html.tld</taglib-uri>
 <taglib-location>/WEB-INF/tld/struts-html.tld</taglib-location>
</taglib>

<taglib>
 <taglib-uri>/WEB-INF/tld/struts-logic.tld</taglib-uri>
 <taglib-location>/WEB-INF/tld/struts-logic.tld</taglib-location>
</taglib>

<taglib>
 <taglib-uri>/WEB-INF/tld/struts-nested.tld</taglib-uri>
 <taglib-location>/WEB-INF/tld/struts-nested.tld</taglib-location>
</taglib>

<taglib>
 <taglib-uri>/WEB-INF/tld/struts-tiles.tld</taglib-uri>
 <taglib-location>/WEB-INF/tld/struts-tiles.tld</taglib-location>
</taglib>
```

App-name.war

- WEB-INF

- web.xml

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Define Your Plan of Actions in the *struts-config.xml*

App-name.war

- WEB-INF

- struts-config.xml

```
<struts-config>

<!-- ==== Global Exception Definitions -->
<!-- Global Exceptions -->
<global-exceptions>
   <exception type="java.lang.Exception" key="none"
    handler="com.its.actions.WebExceptionHandler" >
   </exception>
</global-exceptions>
```

Define a unified approach to handling errors with your custom exception handler or use one from the DataService frameworks.

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Define Your Plan of Actions in the *struts-config.xml*

App-name.war

- WEB-INF

- struts-config.xml

```
<!-- =======Form Bean Definitions -->

 <form-beans>
  <form-bean name="logonForm"
     type="org.apache.struts.validator.DynaValidatorForm">
     <form-property name="username" type="java.lang.String"/>
     <form-property name="password" type="java.lang.String" />
  </form-bean>

 ....
 </form-beans>
</struts-config>
```

As you can see we define a new form on-the-fly using Struts generic class ***DynaValidatorForm***

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Define Your Plan of Actions in the *struts-config.xml*

App-name.war

- WEB-INF

- struts-config.xml

```
<!-- ======= Action Mapping Definitions -->

<action-mappings>
   <action name="logonForm"
      path="/login" type="com.its.actions.LoginAction">
  <forward name="success" path="/WEB-INF/jsp/Topics.jsp" />
  <forward name="failure" path="index.jsp" />
</action>
<action path="/interpret" type="com.its.actions.ITSAction">
  <forward name="topic" path="/WEB-INF/jsp/Topics.jsp" />
  <forward name="its" path="/WEB-INF/jsp/its.jsp" />
  <forward name="failure" path="index.jsp" />
</action>
</action-mappings>
```

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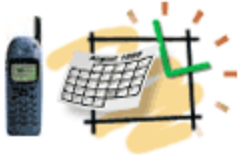

Start Writing a Struts Action

```
public class LoginAction extends Action {
   public ActionForward execute(
        ActionMapping map,
        ActionForm form,
        HttpServletRequest request,
        HttpServletResponse response)
        throws Exception {

        // business logics

        return map.findForward("success");
  }
}
```

Now, look one slide back and figure out that the "success" will pass the control to the **="/WEB-INF/jsp/Topics.jsp"**

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We are going to write JSP
What do you remember about JSP?

– JSP is a mix of Java and HTML code

-Can use JavaBeans as “backend” helpers

– JSP can use JSTL and custom tags to minimize Java code on JSP pages

- JSP is compiled to servlet at run-time by a JSP engine (usually a part of an application server)

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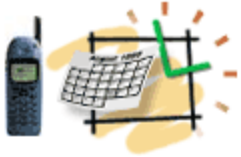

Write the Topic.jsp page

```
<%@taglib uri="/WEB-INF/tld/struts-logic.tld" prefix="logic"%>
<%@taglib uri="/WEB-INF/tld/struts-html.tld" prefix="html" %>
<%@taglib uri="/WEB-INF/tld/struts-bean.tld" prefix="bean" %>
<%@ page import="java.util.*" %>
<%@ page import="com.its.util.*" %>

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01
Transitional//EN">

<%
String worldName = (String)session.getAttribute("worldName");
%>
<html:html>
<html:errors/>
<html:form focus="text" action="CategoryAdd"
        onsubmit="return validateCategoryForm(this);">
<html:hidden property="id" />
```

Find a Java scriplet on the page and compare it with the Struts HTML tags. Tags look much better, right?

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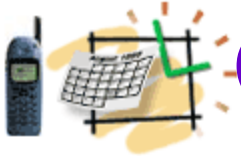

Continue the Topic.jsp page with more Struts Tags and Internationalization

```
<table>
 <tr>
  <td><bean:message key="category.label.text" />:</td>
  <td><html:textarea property="text" cols="100" rows="5" /></td>
 </tr>
<!-- more … -->
 <tr>
  <td>
    <html:submit><bean:message key="category.label.submit" />
    </html:submit>
  </td>
 </tr>
</table>
</html:form>
```

Note the "***bean:message***" tag. This tag refers to messages stored in the application.properties file. In this file the key "category.label.text" has the value, for example, "Category". The beauty of this approach is in possibility to have multiple files, like application.en.properties, application.es.properties, and etc. with values written in different languages.

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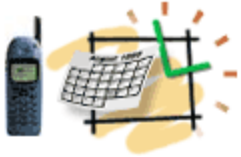

Displaytag Custom Library

```
<%@ taglib uri="http://displaytag.sf.net" prefix="display" %>
<%@ taglib uri="/WEB-INF/tld/struts-bean.tld" prefix="bean" %>
<%@ taglib uri="/WEB-INF/tld/struts-html.tld" prefix="html" %>
<%@ taglib uri="/WEB-INF/tld/struts-logic.tld" prefix="logic" %>

<display:table name="list_categories" requestURI="/CategoryList.do"
class="list">
<display:column property="id" sortable="true" />
<display:column property="text" sortable="true" />
<display:column property="type" sortable="true" />
<display:column url="/CategoryView.do" paramId="id" paramProperty="id">
  <bean:message key="category.label.mod" />
</display:column>
<display:column url="/CategoryDel.do" paramId="id" paramProperty="id">
  <bean:message key="category.label.del" />
</display:column>
</display:table>
```

Download the Displaytag library
from http://displaytag.sf.net

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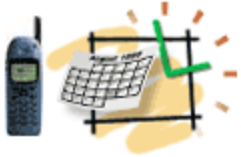

Example from the Login.jsp Page

```
<logic:messagesPresent>
  <UL>
    <html:messages id="error">
      <LI style="font-weight: bold; color: red;"><bean:write name="error"/></LI>
    </html:messages>
  </UL>
 </logic:messagesPresent>
 <html:form action="/login.do?action=logon" method="post"
 focus="username" onsubmit="return checkRegForm(this)" >
 <table align="center"><tr><td align="right">
            <bean:message key="login.label.username" />: </td>
          <td align="left"><html:text property="username" /></td></tr>
    <tr><td align="right"><bean:message key="login.label.password" />:</td>
          <td align="left"><html:password property="password" /></td></tr>
    <tr><td align=right><html:submit property="submit" value="Login" /></td>
    </tr></table>
```

Note, 3 Struts tag libraries: “logic”, “bean”, and “html”.

Look at the form tag and find out a parameter used in the POST method

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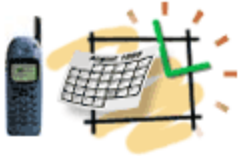

Struts Summary

- Extends Servlet-Controller ….
- Uses ***struts-config.xml file*** to ….
- Collects the data from the web forms into …
- Maps each ***Action*** to its ***…*** in the ***…***
- Introduces a powerful set of …

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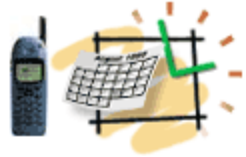

Struts Summary

- Extends Servlet-Controller in a function-specific ***Action***
- Uses ***struts-config.xml file*** to define all function-actions
- Collects the data from the web forms into specific ***ActionForm*** classes that keep data state between requests
- Maps each ***Action*** to its ***ActionForm*** in the ***struts-config.xml***
- Introduces a powerful set of tag libraries
- And more…

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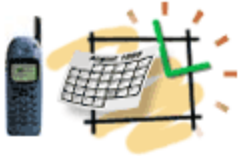

Displaytag Custom Library Makes Easy Creating Tables With Sorted Columns

jzhuk
@ CIA Exam Facilities

List categories | List Topics | List questions | Run test | Log Out
New category | New Topic | New question | Upload

Id	Category.text	TopicName	
1	General	UML	Mod
2	General	OOA	Mod
4	Try	demo	Mod

Certified Integration Architect Exam

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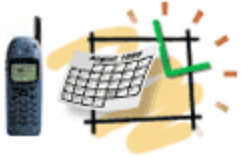
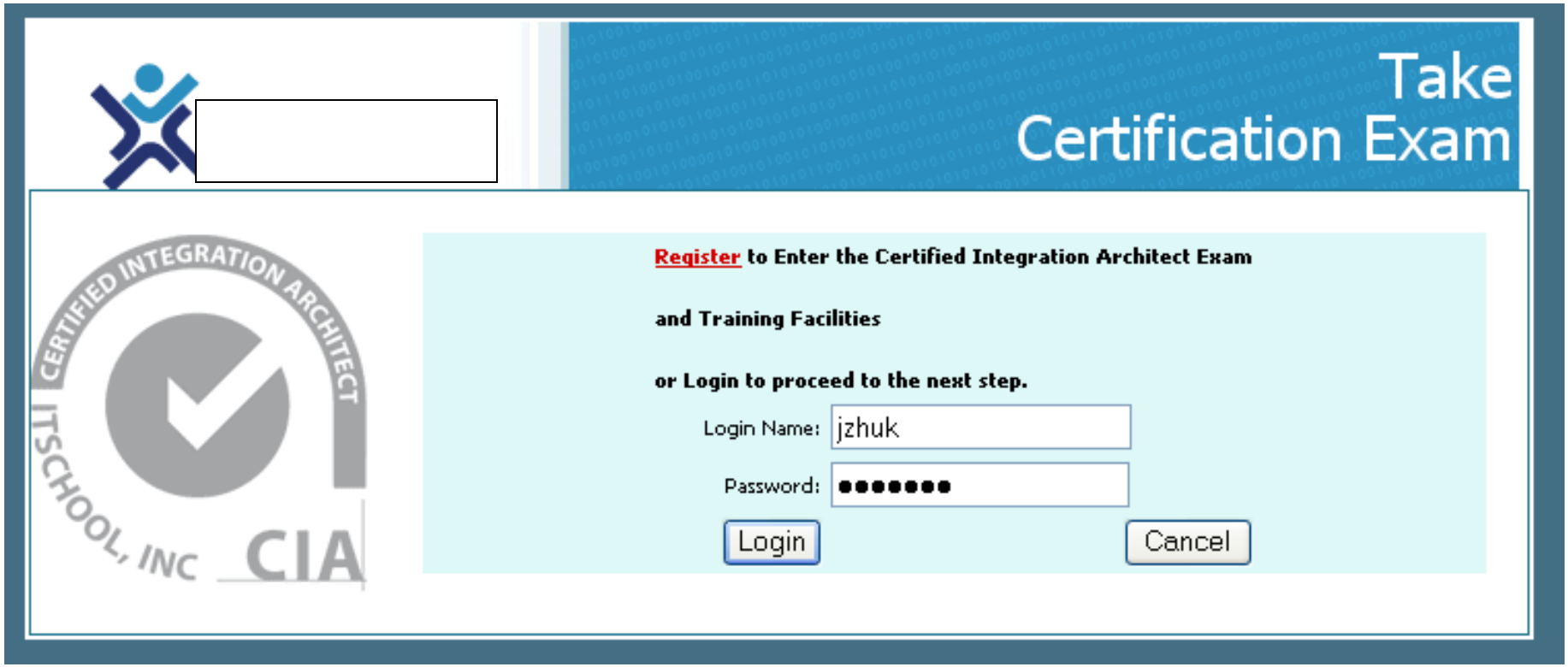


Here is the Login.jsp Page



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Data Access from Web Application

```
public User getUserById(int id, String psw) {
 try {
  DataManager dm = DataManager.init(); // locate DB connection pool
  Connection conn = dm.getConnection(); // get individual connection
  PreparedStatement prpStmt = conn.prepareStatement(
  "SELECT username, roleID from users where userID=? and psw=?”);
  prpStmt.setInt(1,id);
  prpStmt.setString(2,psw);
  User user = new User();
  ResultSet rs = prpStmt.executeQuery();
  while (rs.next()) {
     String username = rs.getString(1);
     int roleID = rs.getInt(2);
     user.setName(username);
     user.setRoleID(roleID);
   }
   rs.close();
   prpStmt.close();
  } catch (SQLException e) {
    e.printStackTrace();
    return null;
  }
   return user;
}
```

This is not the best code you can find but this is the most common approach to data access via JDBC. This code can be located in EJB or plain Java class working with data.

Note, that with this approach we must remember data types and provide multiple lines of code each time we access data.

Some of these lines are very generic and can be provided by frameworks.

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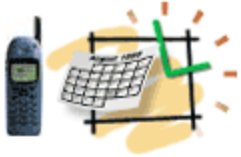
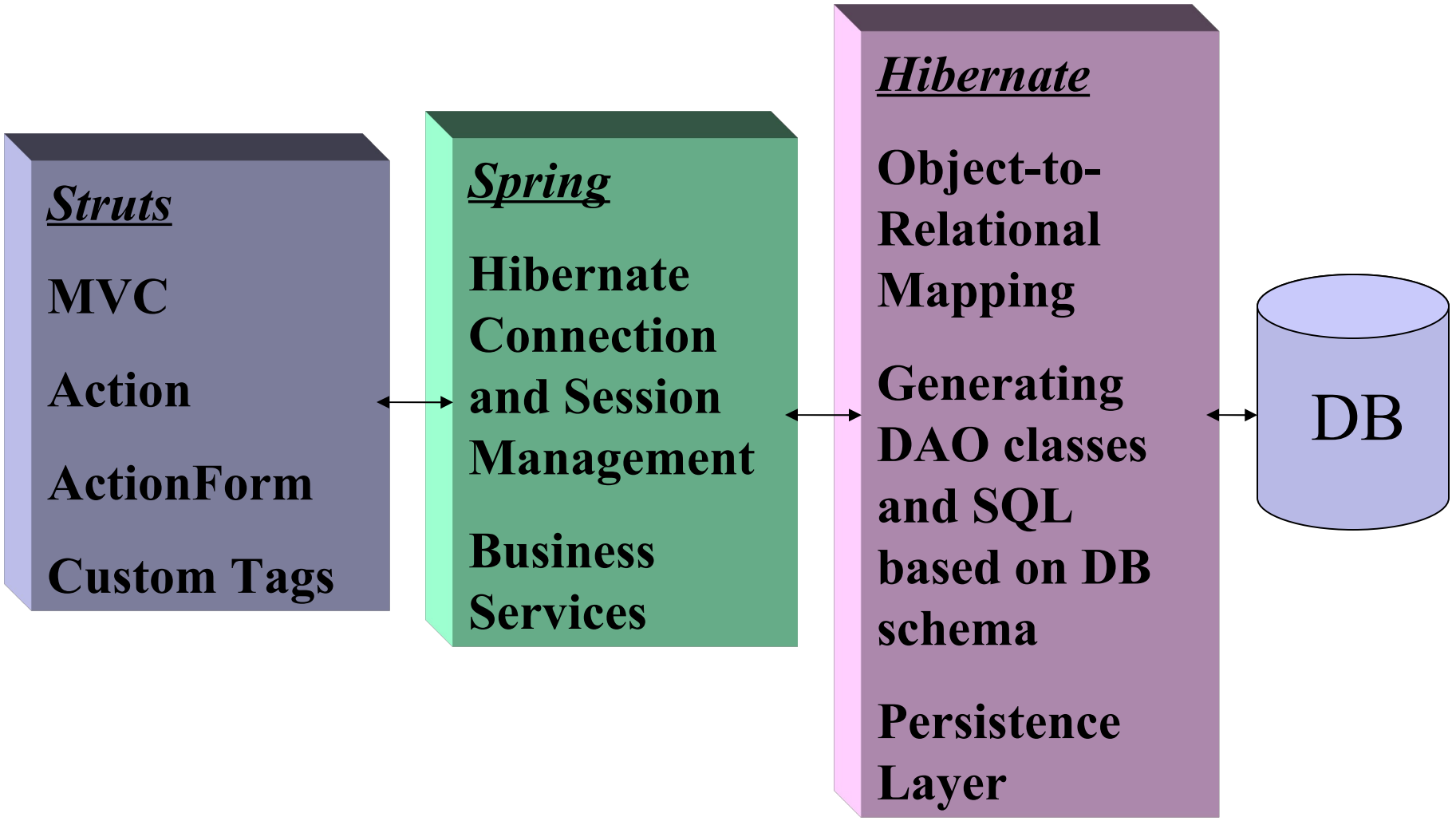


Struts – Spring - Hibernate



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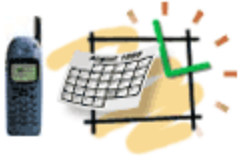

Hibernate

- Uses OO query language called HQL
- Uses objects instead of tables and fields instead of columns
- Provides object-to-relational mapping for most DBs
- Separates data layer from business logics
- Uses DB connection info to retrieve DB schema
- Generates DAO beans with data fields mapping table columns
- Generates Insert/Update/Delete/Select statements for DB tables

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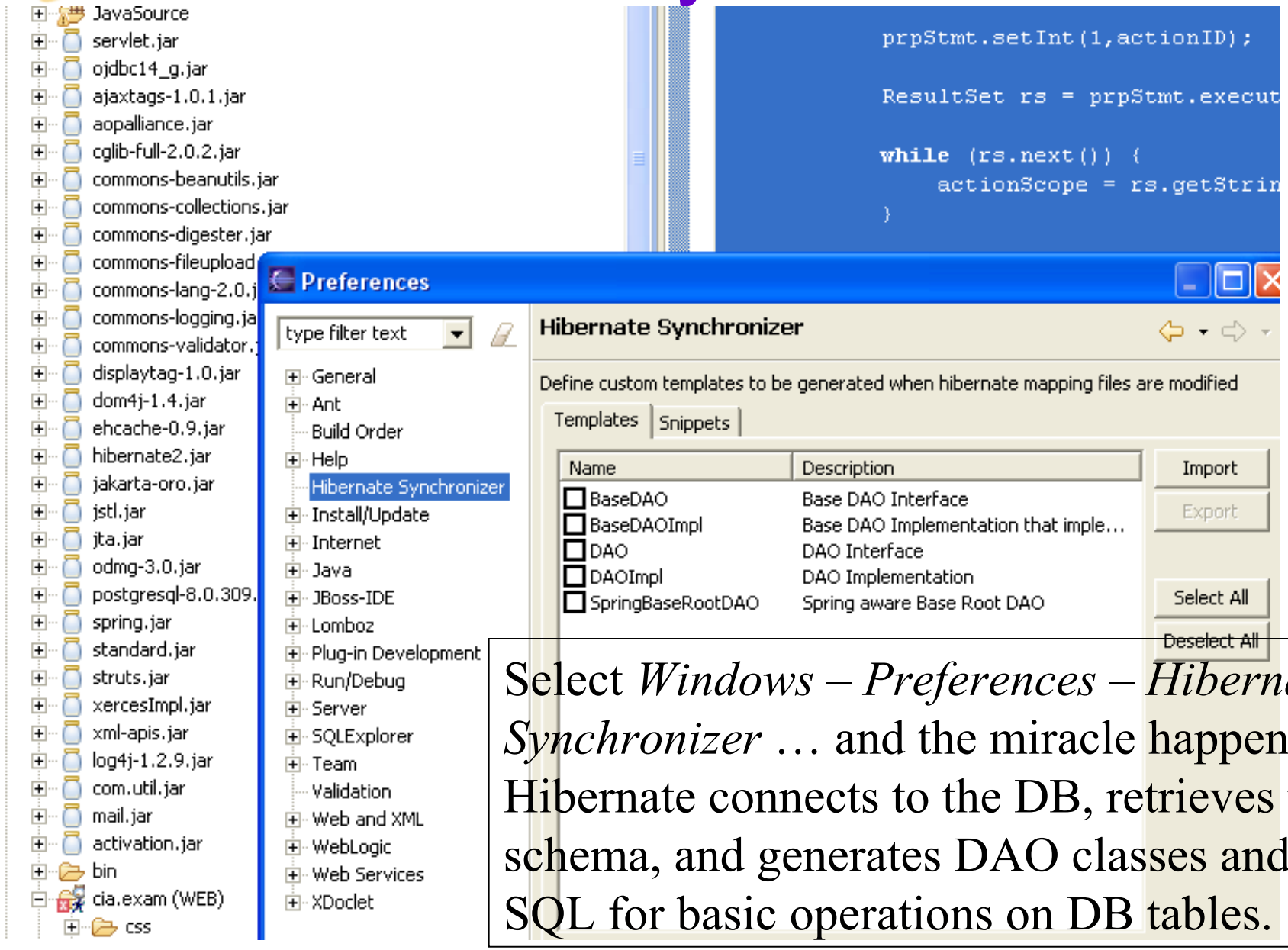
Hibernate Synchronizer



Select *Windows – Preferences – Hibernate Synchronizer* … and the miracle happens: Hibernate connects to the DB, retrieves the schema, and generates DAO classes and SQL for basic operations on DB tables.

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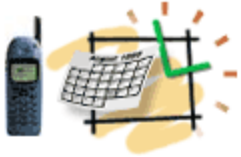


Spring's Map to Hibernate

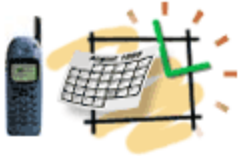
```
<beans>
  <!--PERSISTENCE DEFINITIONS -->
  <bean id="myDataSource"
  class="org.springframework.jndi.JndiObjectFactoryBean">
      <property name="resourceRef"><value>true</value></property>
      <property name="jndiName">
         <value>jdbc/javatest</value>
      </property>
   </bean>

  <!– Connect to Hibernate and match your "dataSource" definition -->
  <bean id="mySessionFactory"
class="org.springframework.orm.hibernate.LocalSessionFactoryBean">
     <property name="mappingResources">
       <list>
         <value>CIAExamAnswer.hbm.xml</value>
         <value>UserRoles.hbm.xml</value>
         <value>InstructorCategory.hbm.xml</value>
       </list>
     </property>
```

App-name.war

-WEB-INF

-- applicationContext.xml



Spring Maps Data Source Dialect and Provides Transaction Management

```
<property name="hibernateProperties">
        <props>
          <prop key="hibernate.dialect">
             net.sf.hibernate.dialect.PostgreSQLDialect</prop>
          <prop key="hibernate.show_sql">true</prop>
          <prop key="hibernate.cglib.use_reflection_optimizer">true</prop>
        </props>
      </property>

      <property name="dataSource">
        <ref bean="myDataSource"/>
      </property>
    </bean>
 <!-- Transaction manager for a single Hibernate SessionFactory -->
    <bean id="myTransactionManager"
class="org.springframework.orm.hibernate.HibernateTransactionManager">
      <property name="sessionFactory">
        <ref local="mySessionFactory"/></property>
    </bean>
```

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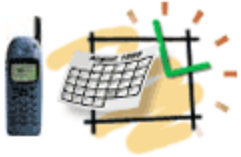

Spring and Hibernate Reduce Business Code

The sessionFactory property and the mySessionFactory bean are related in the Spring configuration file.

Spring creates described objects and factories that instantiate Hibernate DAO classes at run-time.

Spring simplifies the Hibernate configuration that otherwise would be stored in the *hibernate.cfg.xml* file.

The bottom line: Spring and Hibernate working together reduce your business code, ***especially when you operate with simple data records that reflect full table structure***.

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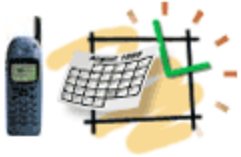

Example of DAO Class Generated by Hibernate

```
public class InstructorCategory extends BaseInstructorCategory {

/*[CONSTRUCTOR MARKER BEGIN]*/
	public InstructorCategory () {
		super();
	}
	/**
	 * Constructor for primary key
	 */
	public InstructorCategory (
		com.its.cia.persistence.Users _user,
			com.its.cia.persistence.TestCategory _category) {
		super (_user, _category);
	}

/*[CONSTRUCTOR MARKER END]*/
}
```

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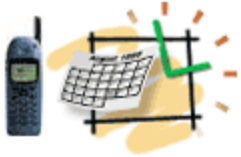

Data Service & Semantic Frameworks by ITS, Inc., JavaSchool.com

Spring and Hibernate are perfect solutions when development can transit from SQL to objects and rely on Object-Relational Mapping (ORM) mechanisms and automatic SQL generation.

There are cases when developers want to keep full control on complex SQL statements, when creating and debugging SQL is an essential part of the development efforts.

The **Data Service & Semantic frameworks** by ITS, Inc. focus on these cases and alone with data handling provide mechanisms for application monitoring, diagnostics and semantic self-awareness.

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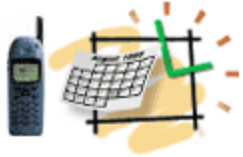


Struts/Portal – DataService

Struts

MVC

Action

ActionForm

Custom Tags

Portal/Portlets

JSR 168

JSR 286

Render

ProcessAction

DataService & Semantic Frameworks by ITS, Inc.

DataAction extends StrutsAction

PortletDataAction extends StrutsPortlet

Takes care of connections, and data types

No ORM, You master SQL and store statements in files in the WEB-INF/sql - folder

Persistence Layer

Easy, no configuration files

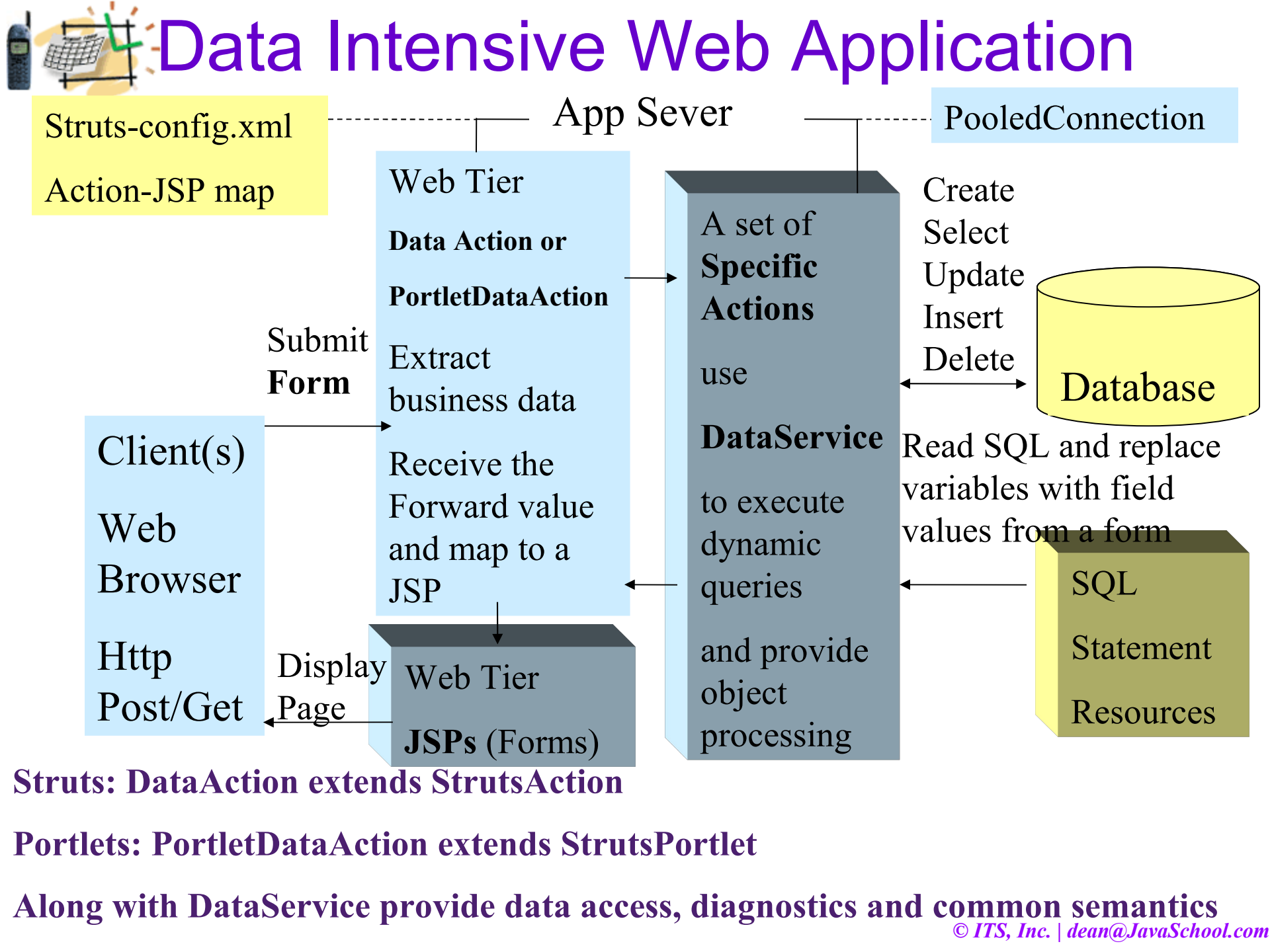
Self-Testing & Diagnostics Layer

Service descriptions, rules & scenarios

DB

ean@JavaSchool.com

Data Intensive Web Application



Struts: DataAction extends StrutsAction

Portlets: PortletDataAction extends StrutsPortlet

Along with DataService provide data access, diagnostics and common semantics

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Design and Code Hints

Use common data services, avoid code duplications, and focus more on a business side of applications.

WEB-INF/sql/getUser.sql

Select * from users where loginName = ':loginName'

```
keys.put("loginName", form.getLoginName()); // common HashMap keys

List records = DataService.getData("getUser", keys, User.class);

User user = (User) records.get(0);
```

Don't mess with SQL in Java code. Keep it in separate files in the SQL directory.

Connections, Pooling, ResultSet Processing, and more reusable functions are provided with the DataService methods.

Don't duplicate this code, use it, and focus on your specific business!

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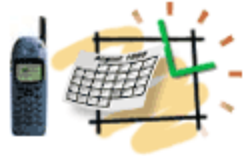

OMD

Web Container and Application Server *Works with*

HTTPServlet

Form

Action

Uses

DataAction

keys: HashMap

execute()

abstract perform()

ServletContextListener interface

ITSServletContextListener

contextInitialized() – init data

initialize() – to be overriden by a subclass

MyServletContextListener

initialize() – custom initialization

SpecificAction1

specificData

perform()

SpecificAction2

specificData

perform()

Uses

DataService

dataSource DataSource

dataSources Hashtable

getData(sqlName, map, bean.class) : List

setData(sqlName, map)

setDataSource(DS)

Uses

Color Legend: ___ **Java library**

___ Custom Library in the **com.util.jar**

___ **Java classes we need to code**

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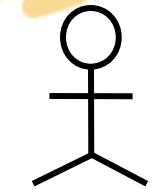
Sequence Diagram



Client

DataAction | **Specific Service Action** | **DataService**

Events/Operations

Http Post/Get

Extract data from the page and call a proper service

Request SQL execution with SQL statement name and map of parameters

Generic data processing: Retrieve SQL from resources; Replace run-time variables; Execute SQL, process ResultSet (if any) and return a list of object-beans

Specific processing; Work with objects and prepare data for JSP

Pass data saved in data beans, Session, or Request objects to JSP

Map the Forward value to a proper JSP (via Struts-config.xml) and display the next JSP page

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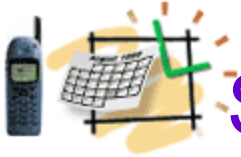

Specific Action Implementation Example

```
public class LoginAction extends DataAction { // PortletDataAction in portlets

  public String perform(HttpServletRequest request) throws Exception {
    ……
      List beans = DataService.getData(

        "getLogin",   // name of the SQL file is “getLogin.sql”

        keys,         // HashMap of key-values collected by DataAction

        LoginBean.class); // class that matches expected record structure

      if(beans.size() == 1) { // SUCCESS!
        LoginBean user = (LoginBean) beans.get(0);
        session.setAttribute(“user”, user);
        return “success”;
      }
      …….
      return “failure”;
  }
```

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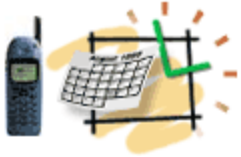

LoginBean Class Example

```
package beans;

/**
 * The LoginBean class matches the record selected by the getLogin.sql
 * A hint: provide variable names in alphabetical order
 */
public class LoginBean {
   private String loginName;
   private String password;

   public String getLoginName() { return loginName;   }
    public String getPassword() { return password;   }
   public void setLoginName(String name) { loginName = name;   }
   public void setPassword(String psw) { password = psw;   }
}
```

App-name.war
-WEB-INF
-- sql
--- getLogin.sql

select username, password from LoginTable
where username = ':loginName' and password = ':password‘

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SQL Statements

SQL statements are stored as separate files in the SQL directory in the WEB-INF area

Samples below demonstrate how SQL statements and their usage by DataService methods

List beans = DataService.getData("getLogin", keyMap, LoginBean.class);
Two lines below is stored in the “getLogin.sql” file

```
select username, password from LoginTable
where username = ':loginName' and password = ':password‘
```

int nRecords = DataService.setData(“insertUser”, map);
The line below is stored in the “insertUser.sql” file

```
Insert into LoginTable values(':loginName‘, ':password‘)
```

Note that run-time variable names follow the “:" character

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Data Status Diagnostics

Web Container and Application Server *Works with*

ServletContextListener interface

ITSServletContextListener
contextInitialized() – init data
initialize() – to be overriden by a subclass

MyServletContextListener
initialize() – custom initialization

NumberOfChanges:
NumberOfQueries:

FirstConnectionTime:
LastConnectionTime:

NumberOfErrors:

Errors:

MaxQueryTime:
LongestQuery:

Reports run-time status of data sources

DataService
dataSource DataSource
dataSources Hashtable
getData(sqlName, map, bean.class) : List
setData(sqlName, map)
setDataSource(DS)

Uses

Remote/Data Status **Local/Data Status**

Legend: ___ **Java library**
___ Custom Library in the **com.util.jar**
___ **Java classes we need to code**

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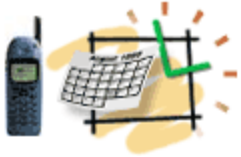
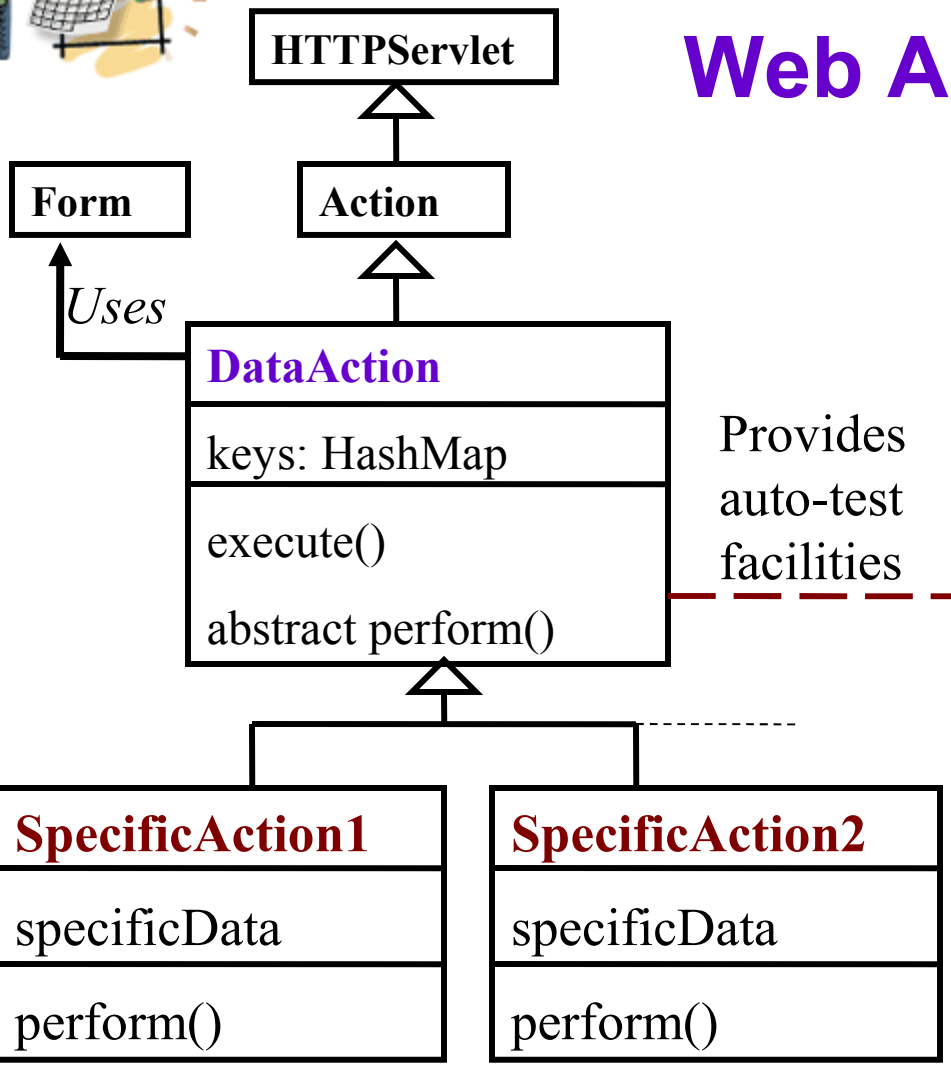


Self-Test Facilities
Web Application Unit Test



Provides auto-test facilities

Test a selected action or

a sequence of actions

Debug a specified method

in a specified class

Check data with your query

Remote/test.do

Local/test.do

Local/Test **All Actions**

Legend: ___ **Java library**

___ Custom Library in the **com.util.jar**

___ **Java classes we need to code**

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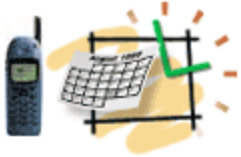

Automated System Test Scenario

```
<Scenario name="Test User Management Functions" >
  <Action name="/LoginAction">
      <!– Replace default form data -->
  <initData name1="value1" />
      <!– Set attributes for Request and Session objects -->
  <requestAttributes name1="value1" />
   <sessionAttributes name1="value1" />
       <!– Set expectations -->
    <expectedResults location=… name=…. Value=…. />
  </Action>

  <Action name="/CreateUserAction">
  ……
  </Action>
</Scenario>
```

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DataService API

Include the library "com.its.util.jar" in the CLASSPATH and import com.its.util.DataService

```
// execute insert/delete/update SQL statements stored in the "sqlLocation"
@ param sqlStatementName for example "getLogin" stored as the "getLogin.sql"
@ param map of key-values to replace SQL <<keys>> with run-time values
@ return numberOfRowsEffected
public static int setData(String sqlStatementName, HashMap map)
// use other than "DataSource" connection pool
public static int setData(String sqlStatementName, HashMap map, String dsName)

// execute select statement and return a list of record-beans
@ param sqlStatementName for example "getLogin" stored as the "getLogin.sql"
@ param map of key-values to replace SQL <<keys>> with run-time values
@ param beanClass (e.g. LoginBean.class) supports records retrieved by the SQL statement
@ return list of objects of the beanClass
public static List getData(String sqlStatementName, HashMap map, Class beanClass)
// use other than "DataSource" connection pool
public static List getData(String sqlName, HashMap map, Class beanClass, String dsName)

@param dataSource your DataSource specified in JNDI context
@param dataSourceName of your DataSource specified as JNDI name
public static void setDataSource(DataSource dataSource, String dsName)
public static void setDataSource(DataSource dataSource)
```

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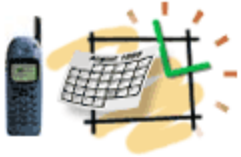

More DataService API

```
// execute insert/delete/update SQL statements
@ param sqlStatement
@ return numberOfRowsEffected
public static int setData(String sqlStatement)
// use other than "DataSource" connection pool
public static int setData(String sqlStatement, String dsName)

// execute select statement and return a list of record-beans
@ param sqlStatement
@ param beanClass supports records retrieved by the SQL statement
@ return list of objects of the beanClass
public static List getData(String sqlStatement, Class beanClass)
// use other than "DataSource" connection pool
public static List getData(String sqlStatement, Class beanClass, String dsName)

// If application creates data from scratch – no SQL is needed
boolean createTable(String tableName, Class class)
Example:
DataService.createTable("LoginTable", LoginBean.class);

 int insert(String tableName, Object[] objects)

Example:
LoginBean[] logins; // array of beans populated in an action
int nRows = DataService.insert("LoginBean", logins);
```

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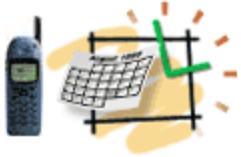

Use DataService Frameworks to Define Custom Actions in the *struts-config.xml*

App-name.war

- WEB-INF

- struts-config.xml

```
<action path="/CheckDataConsistency"
   type="com.its.util.actions.CheckDataAction">
  <description>
  - Search for duplicate records
   [br]
   If found,
   the "Remove Duplicates" link will be provided below.
  </description>
</action>
```

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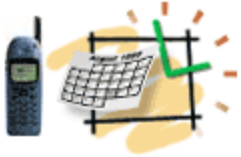
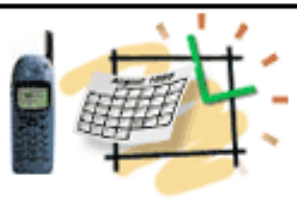


Diagnostics and Custom Actions

Javaschool Diagnostics



Check Status @ jeff/10.102.112.28

Data Status Application Status

server1 server2 server3 server4 server5 server6 server7 server8

Validate and sync user data.
Application functionality is highly sensitive to data quality. The application is extended with self-control and diagnostics functions that can detect and fix data errors. It is highly recommended to check and fix duplicate records first.
The level of troubleshooting messages is LOW. Click here to change this.

Check Data Consistency - Search for duplicate records
If found, the "Remove Duplicates" link will be provided below

Check Data: Enter your QUERY to check data in the selected data source

Select from known data sources or Enter a connection URL in the text field below

DataService.getData

Type and Test an Action

Example: com.its.mail.Email.sendMail(to=jzhuk@javaschool.com,msg=Hello)

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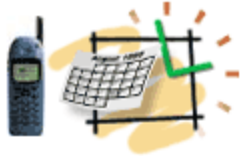

Exception handling with DataService

Problem

Even in the professional web applications the error screens often look not very professional and they differ from application to application.

Solution

Handling exceptions in web applications is partially standardized by Struts frameworks.

Struts configuration file can include pointers to error handler actions.

The WebExceptionHandler class extends Struts Error Handler to provide a standard look and feel to all error pages across web applications.

It is recommended to include the section below in the struts configuration file to point to a standard handler that generates a standard error screen.

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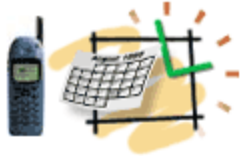
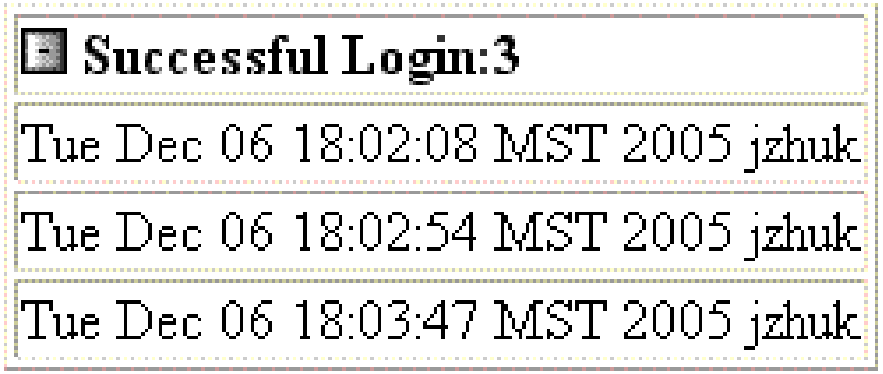


Use DataService Diagnostics Facilities

```
// Provide this code your Java class
} catch(Exception e) {
   Stats.addAppList(appName,
      "WebDisp Errors",
      e.getMessage());
}
```

This code will communicate the error to the DataService diagnostics facilities. See on the right side how such records look on the web page




```
<!– Provide these lines in your web.xml file -->
<global-exceptions>
  <exception type="java.lang.Exception" key="none"
    handler="com.its.actions.WebExceptionHandler" >
  </exception>
</global-exceptions>
```

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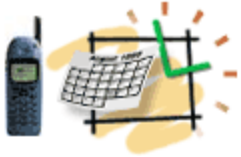


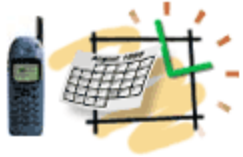
Complementary Semantic Frameworks: Capture Service Descriptions

Register services and service scenarios (one at a time)

Service Signature, for example, com.its.util.XHandler.parse(String xml), or WSDL location

Service Descriptions (keep in mind that these descriptions will be used by search facilities).

Register a new service or scenario



Capture Rules and Scenarios

Rules

v	RULEID	RULE	USERID	DATE	SUBJECT	IMPLEMENTED

Delete Checked Items

Add more rules and reconciliation scenarios (one at a time) for DataSync

Check and add a rule or scenario

ember of a privileged group, you can Change debug level to **LOW (less messages)**, Check Data Status, Sync data, Capture rules and Register Services

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Business Intelligence Repository Based on Data Models, Rules & Scenarios To Enable Collaborative Decision Making, Data Reconciliation and Smart Search

SME

Conversational Interface

Integrity Rules (Inference engine)

Real-Time Input Data

Optimization Solutions

Situational Rules and Scenarios

Business and Technology Mappings

Operations

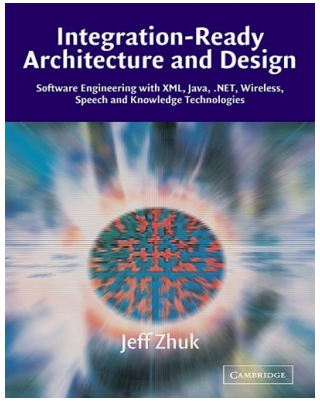
Events

Procedures

Specific Facts and Rules

Generic Facts and Rules

Behavior & Services



* Rules Collector
* Knowledge-Driven Architecture

Integrated Software & Knowledge Engineering
Commonsense Reasoning

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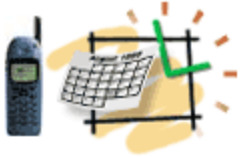
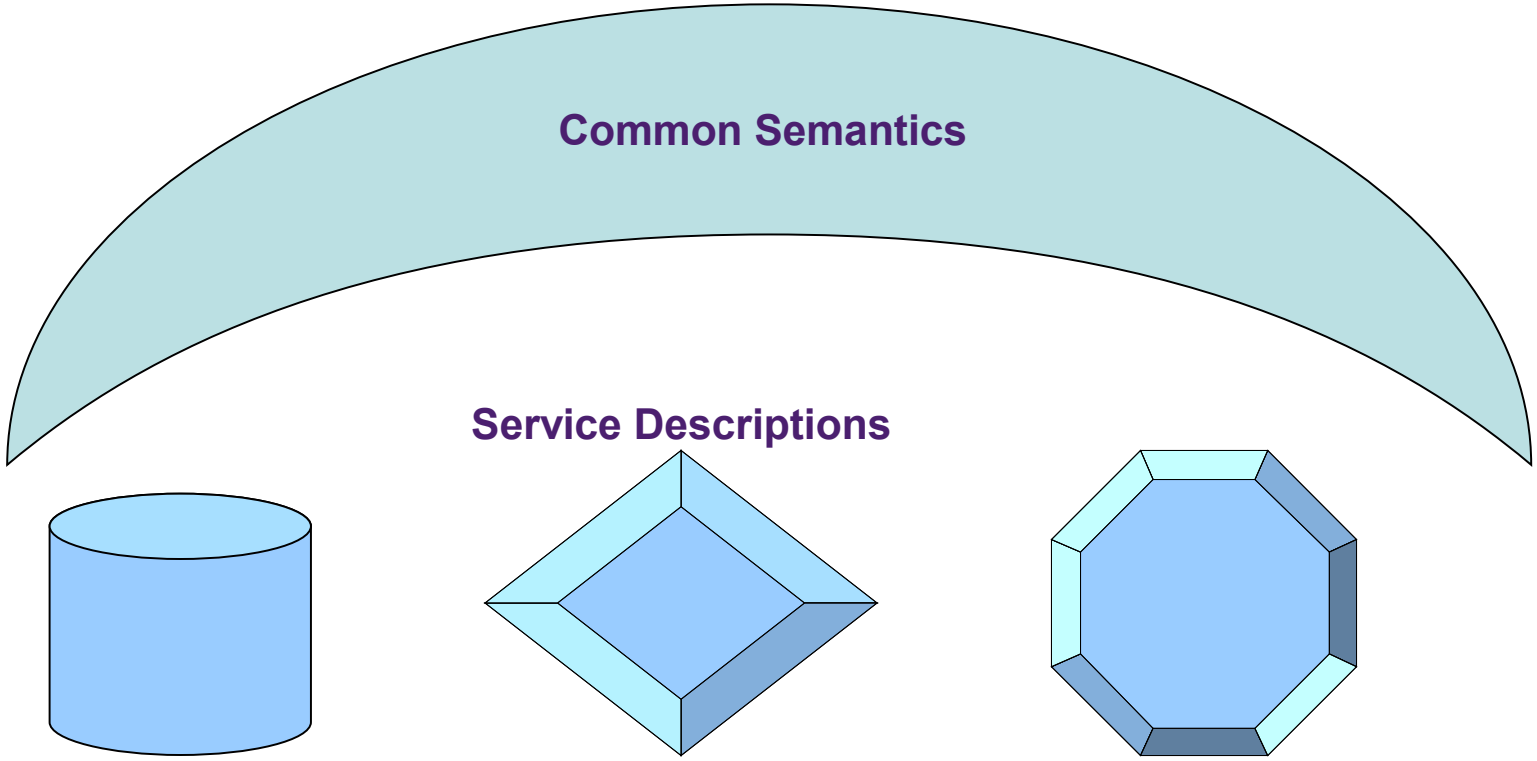


Connecting the Dots with the Data Service & Semantic Frameworks by ITS, Inc.



Ontology tools can get more meaning from business descriptions, rules and scenarios, while improving decision support and automation of development, testing and business processes

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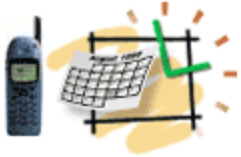


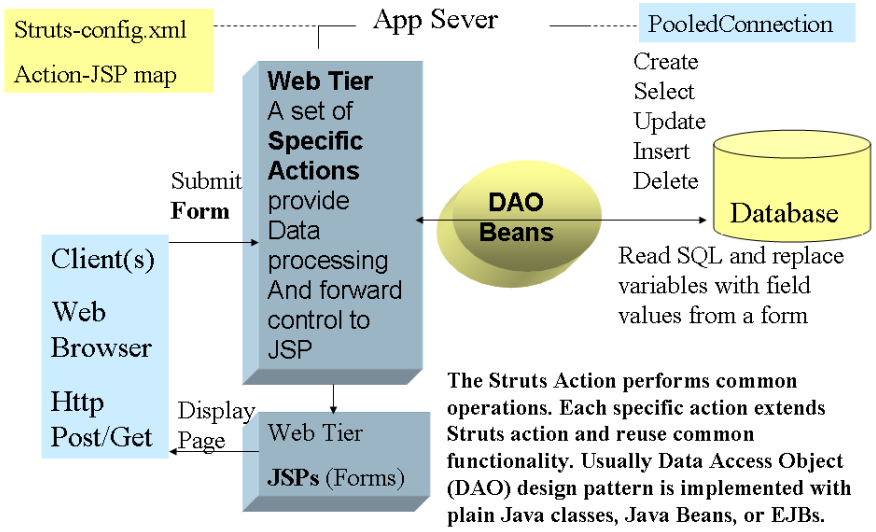
Web Application Frameworks Summary/Repetition

- 1. **Struts**

Struts Frameworks

- 2
  - Extends Servlet-Controller in a function-specific ***Action***
  - Uses ***struts-config.xml file*** to define all function-actions
- 3
  - Collects the data from the web forms into specific ***ActionForm*** classes that keep data state between requests
  - Maps each ***Action*** to its ***ActionForm*** in the ***struts-config.xml***
- 4
  - Introduces a powerful set of tag libraries
  - And more…

Struts Frameworks for Web Application



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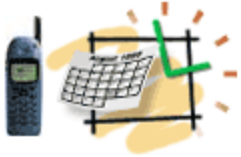
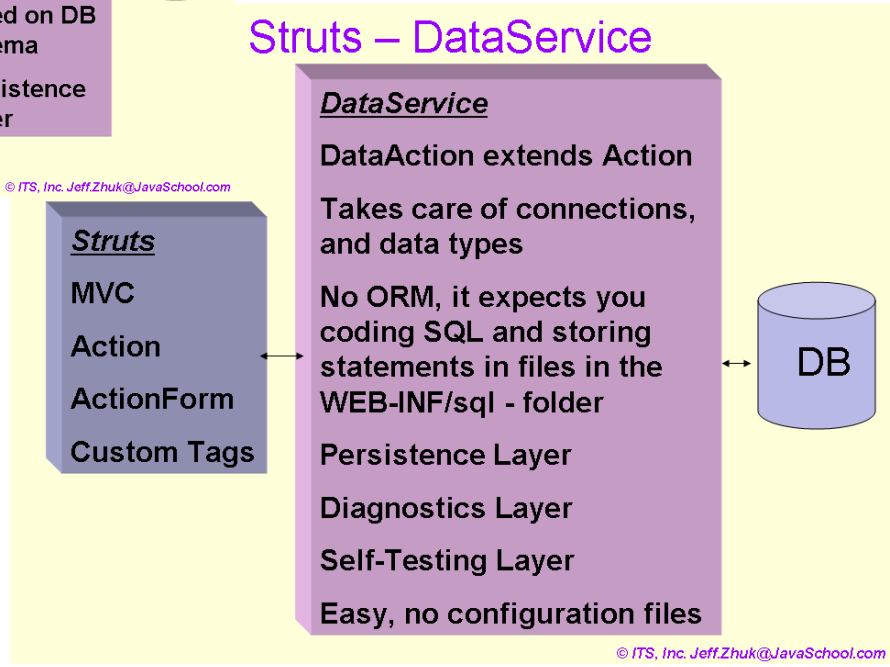


Web Application Frameworks Summary/Repetition

- 1. Struts
- 2 Spring
- 3 Hibernate
- 4 DataService
- Complementary to Struts
- and Portlets Semantic
- Frameworks by ITS, Inc.



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