Spring 2.0 Kickstart

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Web MVC

Introductions

- How many people are current using Spring MVC?
- What about Struts, Tapestry or JSF?
- What do you hope to learn today?

Introduction

Matt Raible

- Spring and Web Frameworks Practice Leader for Virtuas Open Source Solutions
- JCP Expert Group for Java EE, JSF and Bean Validation
- Founder of AppFuse and Equinox projects
- Author "Spring Live" from SourceBeat
- Dad, Husband and Montana Native

What's new in Spring 2.0

- JSP Tag Library for Forms
- Convention over Configuration:
  - ControllerClassNameHandlerMapping
  - ModelMap: don't need to specify model names
  - RequestToViewNameTranslator

http://www.springframework.org/docs/reference/mvc.html#mvc-coc

Spring MVC Basics

- web.xml Configuration
- Controller
- Spring XML Configuration
- SimpleFormController
- View options and Form Tag Library
- Validation

web.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<web-app xmlns="http://java.sun.com/xml/ns/j2ee"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://java.sun.com/xml/ns/j2ee
        http://java.sun.com/xml/ns/j2ee/web-app_2_4.xsd" version="2.4">

    <servlet>
        <servlet-name>kickstart</servlet-name>
        <servlet-class>
            org.springframework.web.servlet.DispatcherServlet
        </servlet-class>
        <load-on-startup>0</load-on-startup>
    </servlet>

    <servlet-mapping>
        <servlet-name>kickstart</servlet-name>
        <url-pattern>*.htm</url-pattern>
    </servlet-mapping>
</web-app>
```

Loading middle-tier beans

```
<?xml version="1.0" encoding="UTF-8"?>
<web-app xmlns="http://java.sun.com/xml/ns/j2ee"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://java.sun.com/xml/ns/j2ee
        http://java.sun.com/xml/ns/j2ee/web-app_2_4.xsd" version="2.4">

    <context-param>
        <param-name>contextConfigLocation</param-name>
        <param-value>classpath:/repository-config.xml</param-value>
    </context-param>

    <listener>
        <listener-class>
            org.springframework.web.context.ContextLoaderListener
        </listener-class>
    </listener>

    ...
</web-app>
```

Controller Interface

- Has *handleRequest()* method that returns a ModelAndView
- Base interface for all controllers: *handleRequest()* can be called in unit tests
- **ModelAndView**: a class that holds both Model and a View
- **AbstractCommandController**: use for populating a command object with request parameters

ModelAndView

- Many constructor options make it easy to use
- View names are logical names that are configured by ViewResolvers
- Model can be Map or a JavaBean object

```
public ModelAndView(String viewName) {
    this.viewName = viewName;
}

public ModelAndView(String viewName, Map model) {
    this.viewName = viewName;
    this.model = model;
}

public ModelAndView(String viewName, String modelName,
                    Object modelObject) {
    this.viewName = viewName;
    addObject(modelName, modelObject);
}
```

Controller

```
public class CustomerController implements Controller {
    private CustomerService customerService;

    public void setCustomerService(CustomerService userService) {
        this.customerService = userService;
    }

    public ModelAndView handleRequest(HttpServletRequest request,
                                      HttpServletResponse response)
    throws Exception {
        return new ModelAndView().addObject(customerService.getListOfCustomers());
    }
}
```

```
<display:table name="customers" class="list" requestURI="" id="customer" export="true">
```

Configuration

- Controllers are configured as bean definitions in *kickstart-servlet.xml* where *kickstart* is the name of the DispatcherServlet in web.xml

```
<bean name="/customers.htm" class="spring.kickstart.web.CustomerController">
    <property name="customerService" ref="customerService"/>
</bean>
```

OR

```
<bean id="customerController" class="spring.kickstart.web.CustomerController">
    <property name="customerService" ref="customerService"/>
</bean>
```

URL Mapping

- **BeanNameUrlHandlerMapping** is the default - where URLs are matched to bean names
- **SimpleUrlHandlerMapping** provides central means of configuring URLs and allows interceptors

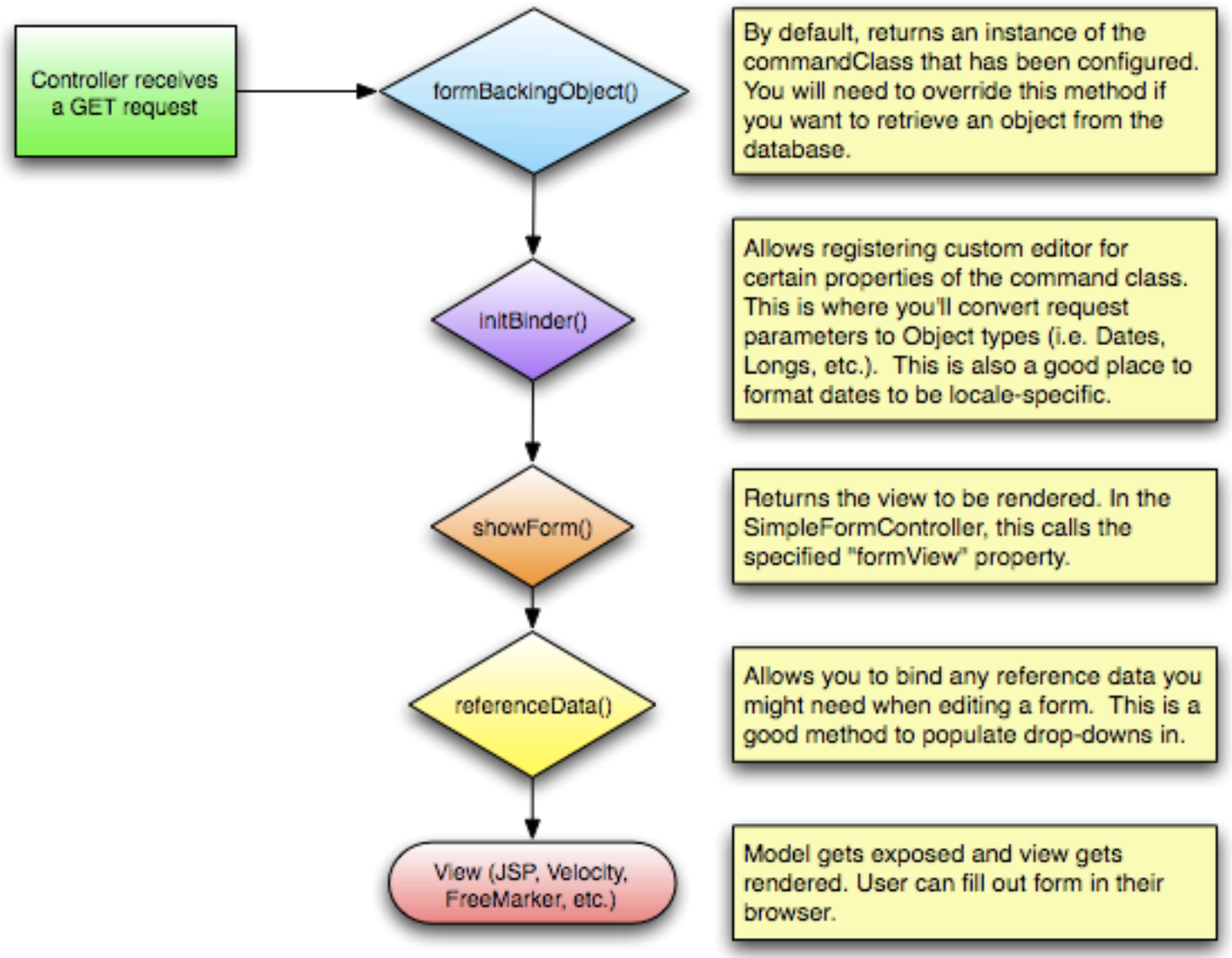
```
<bean id="urlMapping"
    class="org.springframework.web.servlet.handler.SimpleUrlHandlerMapping">
    <property name="mappings">
        <props>
            <prop key="/customers.htm">customerController</prop>
            <prop key="/customerform.htm">customerFormController</prop>
        </props>
    </property>
</bean>
```

- **ControllerClassNameHandlerMapping** allows you to use convention-over-configuration

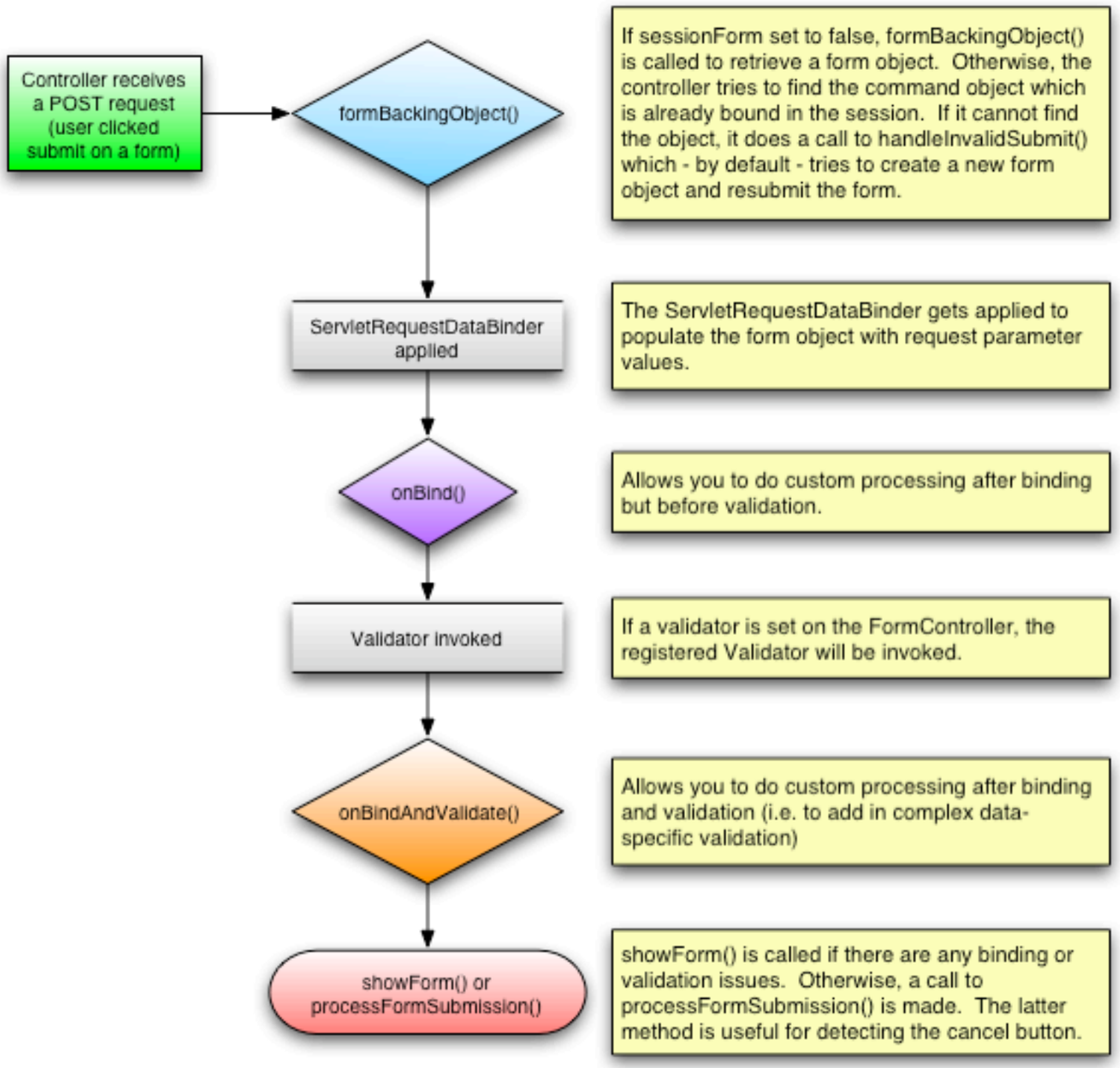
Form Controllers

- **SimpleFormController**: best to use for processing forms
- **AbstractWizardFormController**: use for processing wizards
- **AbstractFormController**: parent of both Simple/AbstractWizardFormControllers. Requires before/after view names to be configured programmatically
- **ThrowawayController**: command pattern with single execute() method

HTTP GET Lifecycle



POST Lifecycle



formBackingObject()

```
protected Object formBackingObject(HttpServletRequest request)
        throws ServletException {
    String id = request.getParameter("id");

    if ((id != null) && !id.equals("")) {
        Customer customer = customerService.locateCustomerById(new Long(id));

        if (customer == null) {
            return new Customer();
        }

        return customer;
    } else {
        return new Customer();
    }
}
```

initBinder()

```
protected void initBinder(HttpServletRequest request,
                          ServletRequestDataBinder binder) {
    // convert java.util.Date
    SimpleDateFormat dateFormat = new SimpleDateFormat("MM/dd/yyyy");
    dateFormat.setLenient(false);
    binder.registerCustomEditor(Date.class, null,
            new CustomDateEditor(dateFormat, true));

    // convert java.lang.Long
    binder.registerCustomEditor(Long.class, null,
            new CustomNumberEditor(Long.class, null, true));
}
```

doSubmitAction()

```
protected void doSubmitAction(Object object) throws Exception {
    Customer customer = (Customer) object;
    if (customer.getId() == null) {
        customerService.addNewCustomer(customer);
    } else {
        customerService.updateCustomer(customer);
    }
}
```

SimpleFormControllerTest

```
public class CustomerFormControllerTest extends AbstractDependencyInjectionSpringContextTests {
    private CustomerFormController form;

    public void setCustomerFormController(CustomerFormController form) {
        this.form = form;
    }

    protected String[] getConfigLocations() {
        return new String[]{"file:**/kickstart-servlet.xml", "repository-config.xml"};
    }

    public void testEdit() throws Exception {
        form = new CustomerFormController(new CustomerServiceMock());
        // verify controller can grab user
        MockHttpServletRequest request = new MockHttpServletRequest("GET", "");
        request.addParameter("id", "1");
        ModelAndView mv = form.handleRequest(request, new MockHttpServletResponse());
        assertEquals("customer", form.getCommandName());
        Customer customer = (Customer) mv.getModel().get(form.getCommandName());
        assertEquals(new Long(1), customer.getId());
    }
}
```

Bean Definition

```
<bean id="customerFormController" class="spring.kickstart.web.CustomerFormController">
    <constructor-arg ref="customerService"/>
    <property name="commandName" value="customer"/>
    <property name="commandClass" value="spring.kickstart.domain.Customer"/>
    <property name="successView" value="redirect:customers.htm"/>
</bean>
```

Bean Definition

```
<bean id="customerFormController" class="spring.kickstart.web.CustomerFormController">
    <constructor-arg ref="customerService"/>
    <property name="commandName" value="customer"/>
    <property name="commandClass" value="spring.kickstart.domain.Customer"/>
    <property name="successView" value="redirect:customers.htm"/>
</bean>
```

```
public class CustomerFormController extends SimpleFormController {
    private CustomerService customerService;

    public CustomerFormController(CustomerService customerService) {
        setCommandClass(Customer.class);
        setCommandName("customer");
        this.customerService = customerService;
    }
    ...
}
```

View Options

- **JavaServer Pages**: includes support for JSTL (i18n, etc.)
- **Tiles**: allows you to use Tiles like you would with Struts - excellent for page composition
- **Velocity**: includes convenience macros to simplify form development
- **FreeMarker**: macros for form development
- **XSLT, PDF, Excel**: create classes to render view
- **JasperReports**: nice open-source reporting engine

View Resolvers

- Bean definition that defines how Spring MVC should resolve views
- Provide de-coupling between Controllers and view technology

JSP/JSTL ViewResolver

```
<!-- View Resolver for JSPs -->
<bean id="viewResolver"
    class="org.springframework.web.servlet.view.InternalResourceViewResolver">
    <property name="viewClass" value="org.springframework.web.servlet.view.JstlView"/>
    <property name="prefix" value="/"/>
    <property name="suffix" value=".jsp"/>
</bean>
```

Velocity ViewResolver

```
<!-- Velocity Configurer and View Resolver -->
<bean id="velocityConfig"
    class="org.springframework.web.servlet.view.velocity.VelocityConfigurer">
    <property name="resourceLoaderPath" value="/"/>
</bean>

<bean id="viewResolver"
    class="org.springframework.web.servlet.view.velocity.VelocityViewResolver">
    <property name="dateToolAttribute" value="date"/>
    <property name="exposeSpringMacroHelpers" value="true"/>
    <property name="requestContextAttribute" value="rc"/>
    <property name="cache" value="true"/>
    <property name="prefix" value="/"/>
    <property name="suffix" value=".vm"/>
</bean>
```

FreeMarker ViewResolver

```
<!-- FreeMarker Configurer and View Resolver -->
<bean id="freemarkerConfig"
    class="org.springframework.web.servlet.view.freemarker.FreeMarkerConfigurer">
    <property name="templateLoaderPath" value="/"/>
    <property name="freemarkerSettings">
        <props>
            <prop key="datetime_format">MM/dd/yyyy</prop>
        </props>
    </property>
</bean>

<bean id="viewResolver"
    class="org.springframework.web.servlet.view.freemarker.FreeMarkerViewResolver">
    <property name="exposeSpringMacroHelpers" value="true"/>
    <property name="requestContextAttribute" value="rc"/>
    <property name="prefix" value="/">
    <property name="suffix" value=".ftl"/>
</bean>
```

JSP vs. Velocity vs. FreeMarker

JSP 2.0 + JSTL

```
<spring:bind path="user.*">
    <c:if test="${not empty status.errorMessages}">
    <div class="error">
        <c:forEach var="error" items="${status.errorMessages}">
            <c:out value="${error}" escapeXml="false"/><br />
        </c:forEach>
    </div>
    </c:if>
</spring:bind>

...

<form method="post" action="<c:url value='/editUser.html'/>"
    onsubmit="return validateUser(this)" name="userForm">
<spring:bind path="user.id">
<input type="hidden" name="id" value="${status.value}"/>
</spring:bind>
<table class="detail">
<tr>
    <th><label for="firstName"><fmt:message key="user.firstName"/>:</label></th>
    <td>
        <spring:bind path="user.firstName">
        <input type="text" name="firstName" id="firstName" value="${status.value}"/>
        <span class="fieldError">${status.errorMessage}</span>
        </spring:bind>
    </td>
</tr>
```

Even easier in 2.0

```
<form:form commandName="user" method="post">
<form:errors path="*" cssClass="error"/>
<form:hidden path="id" />
<table class="detail">
<tr>
    <th><label for="firstName">
        <spring:message code="user.firstName"/>:</label></th>
    <td>
        <form:input path="firstName" id="firstName"/>
        <form:errors path="firstName" cssClass="fieldError"/>
    </td>
</tr>
<tr>
    <th><label for="lastName" class="required">
        * <spring:message code="user.lastName"/>:</label></th>
    <td>
        <form:input path="lastName" id="lastName"/>
        <form:errors path="lastName" cssClass="fieldError"/>
    </td>
</tr>
```

Spring "form" tags

- checkbox
- errors
- form
- hidden
- input
- label
- option
- options
- password
- radiobutton
- select
- textarea

Velocity

```
#set($springXhtmlCompliant = true)

...

#springBind("user.*")
#if ($status.error)
<div class="error">
    #foreach ($error in $status.errorMessages)
        ${error}<br/>
    #end
</div>
#end

...

<form method="post" action="#springUrl('editUser.html')">
#springFormHiddenInput("user.id")
<table>
<tr>
    <th><label for="firstName">#springMessage("user.firstName"):</label></th>
    <td>
        #springFormInput("user.firstName" 'id="firstName"')
        #springShowErrors("<br/>" "fieldError")
    </td>
</tr>
```

FreeMarker

```
<#import "/spring.ftl" as spring/>
<#assign xhtmlCompliant = true in spring>
...

<@spring.bind "user.*"/>
<#if spring.status.error>
<div class="error">
    <#list spring.status.errorMessages as error>
        ${error}<br/>
    </#list>
</div>
</#if>
...

<form method="post" action="<@spring.url '/editUser.html'/>">
<@spring.formHiddenInput "user.id"/>
<table>
<tr>
    <th><label for="firstName">
        <@spring.message "user.firstName"/></label>:</th>
    <td>
        <@spring.formInput "user.firstName", 'id="firstName"'/>
        <span class="fieldError">
            ${spring.status.errorMessage}</span>
    </td>
</tr>
```

Validation

- Many different options for doing Validation
  - Spring's Validator interface
  - Commons Logging from Spring Modules
  - Valang from Spring Modules
  - Bean Validation Framework

Validator Interface

```
public class CustomerValidator implements Validator {
    private MessageSource messageSource;

    @Required
    public void setMessageSource(MessageSource messageSource) {
        this.messageSource = messageSource;
    }

    public boolean supports(Class clazz) {
        return clazz.equals(Customer.class);
    }

    public void validate(Object obj, Errors errors) {
        String arg1 = messageSource.getMessage("customer.name", null,
                              LocaleContextHolder.getLocale());

        ValidationUtils.rejectIfEmptyOrWhitespace(errors,
            "name", "errors.required", new Object[] {arg1}, "Value required.");
    }
}
```

Commons Validator

- Spring support created by Daniel Miller in April 2004
- Moved from Spring CVS sandbox to Spring Modules project in April 2005
- Validation rules specified in /WEB-INF/ *validation.xml*
- Validators (client and server-side) configured in /WEB-INF/*validator-rules.xml*

Bean Definitions

```
<bean id="validatorFactory"
    class="org.springmodules.validation.commons.DefaultValidatorFactory">
    <property name="validationConfigLocations">
        <list>
            <value>/WEB-INF/validation.xml</value>
            <value>/WEB-INF/validator-rules.xml</value>
        </list>
    </property>
</bean>

<bean id="beanValidator"
    class="org.springmodules.validation.commons.DefaultBeanValidator">
    <property name="validatorFactory" ref="validatorFactory"/>
</bean>
```

validation.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE form-validation PUBLIC
    "-//Apache Software Foundation//DTD Commons Validator Rules Configuration 1.3.0//EN"
    "http://jakarta.apache.org/commons/dtds/validator_1_3_0.dtd">

<form-validation>
    <formset>
        <form name="customer">
            <field property="name" depends="required">
                <arg0 key="customer.name"/>
            </field>
        </form>
    </formset>
</form-validation>
```

Client-side Validation

- Form's *onsubmit* handler:

```
<form:form method="post" action="customerform.htm"
      onsubmit="return validateCustomer(this)" name="customerForm">
```

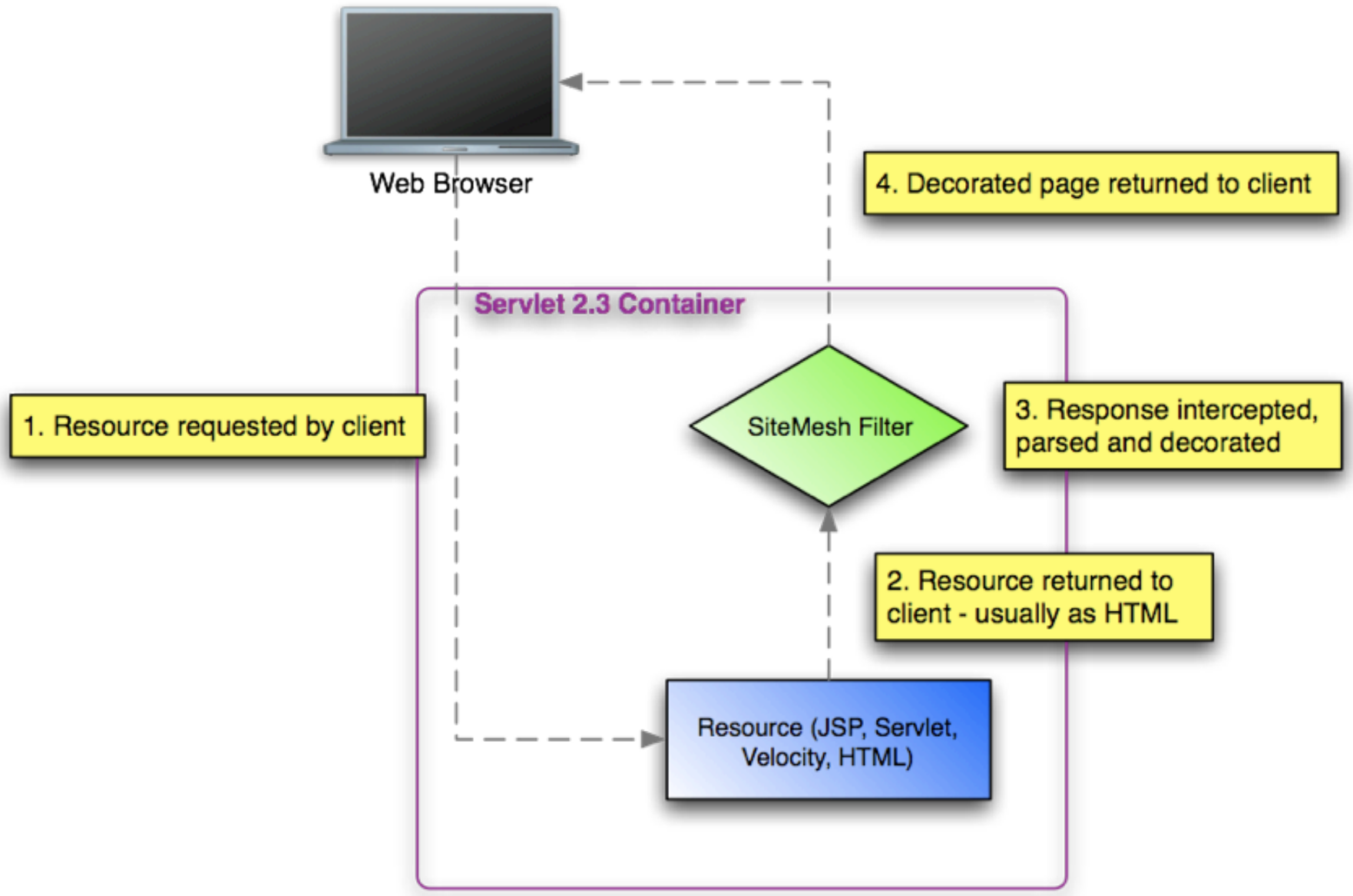
- JavaScript tags after form:

```
<v:javascript formName="customer" staticJavascript="false"
    xhtml="true" cdata="false"/>
<script type="text/javascript"
    src="<c:url value="/scripts/validator.jsp"/>"></script>
```

- /scripts/validator.jsp

```
<%@ page language="java" contentType="text/javascript" %>
<%@ taglib uri="http://www.springmodules.org/tags/commons-validator"
    prefix="v" %>

<v:javascript dynamicJavascript="false" staticJavascript="true"/>
```

Decorating with SiteMesh



SiteMesh: web.xml

```
<filter>
    <filter-name>sitemesh</filter-name>
    <filter-class>com.opensymphony.module.sitemesh.filter.PageFilter</filter-class>
</filter>

<filter-mapping>
    <filter-name>sitemesh</filter-name>
    <url-pattern>/*</url-pattern>
    <dispatcher>REQUEST</dispatcher>
    <dispatcher>FORWARD</dispatcher>
</filter-mapping>
```

/WEB-INF/sitemesh.xml

```
<sitemesh>
    <property name="decorators-file" value="/WEB-INF/decorators.xml"/>
    <excludes file="${decorators-file}"/>
    <page-parsers>
        <parser default="true"
            class="com.opensymphony.module.sitemesh.parser.FastPageParser"/>
        <parser content-type="text/html"
            class="com.opensymphony.module.sitemesh.parser.FastPageParser"/>
        <parser content-type="text/html;charset=ISO-8859-1"
            class="com.opensymphony.module.sitemesh.parser.FastPageParser"/>
    </page-parsers>

    <decorator-mappers>
        <mapper class="com.opensymphony.module.sitemesh.mapper.ConfigDecoratorMapper">
            <param name="config" value="${decorators-file}"/>
        </mapper>
    </decorator-mappers>
</sitemesh>
```

/WEB-INF/decorators.xml

```
<decorators defaultdir="/decorators">
    <excludes>
        <pattern>/demos/*</pattern>
        <pattern>/resources/*</pattern>
    </excludes>
    <decorator name="default" page="default.jsp">
        <pattern>/*</pattern>
    </decorator>
</decorators>
```

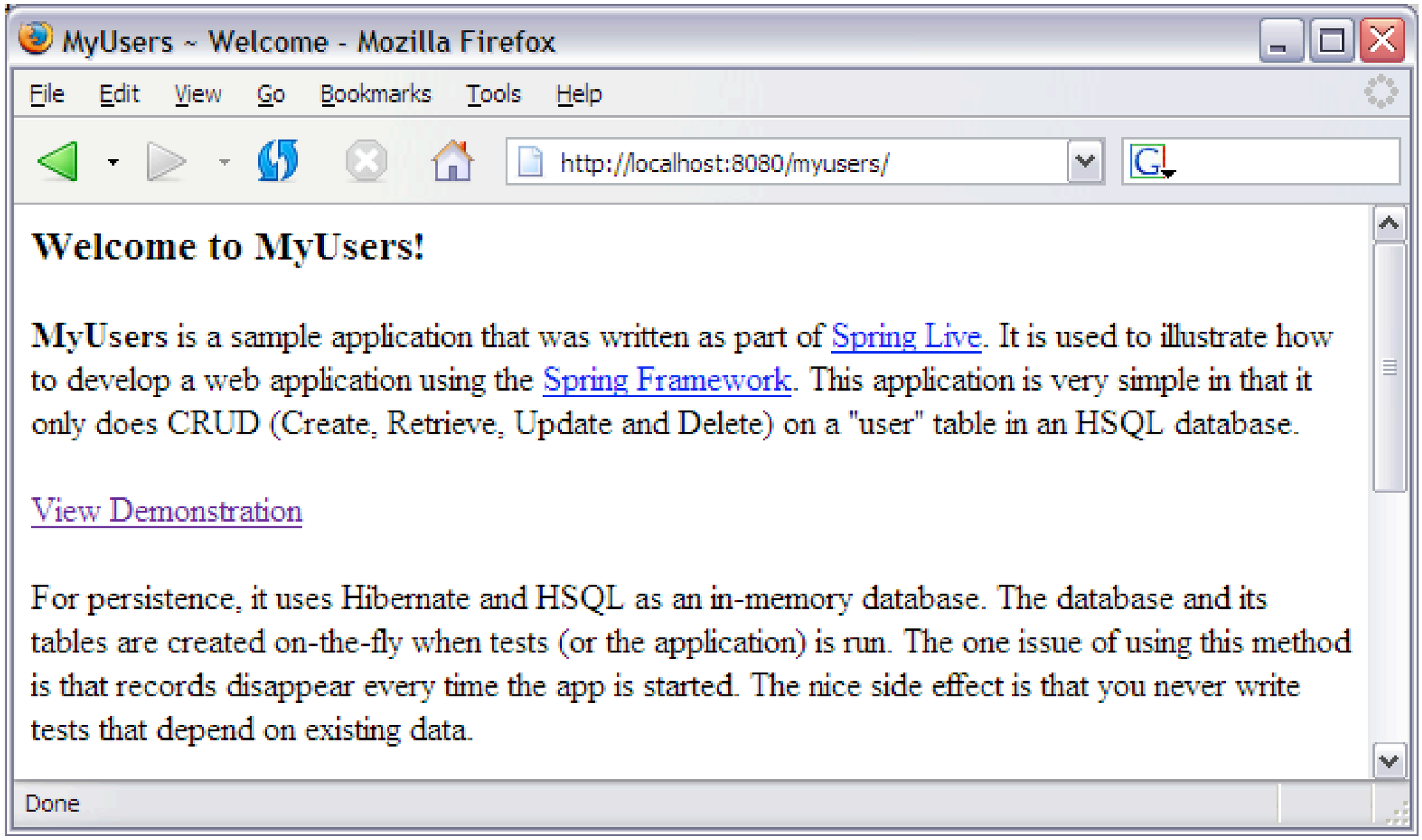
Sample Decorator

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
    "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">

<%@ include file="/taglibs.jsp"%>

<html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en">
<head>
    <title><decorator:title default="Equinox"/></title>
    <meta http-equiv="content-type" content="text/html; charset=utf-8"/>
    <link href="${ctx}/styles/global.css" type="text/css" rel="stylesheet"/>
    <link href="${ctx}/images/favicon.ico" rel="SHORTCUT ICON"/>
    <script type="text/javascript" src="${ctx}/scripts/global.js"></script>
    <decorator:head/>
</head>
<body<decorator:getProperty property="body.id" writeEntireProperty="true"/>>
<a name="top"></a>

    <div id="content">
        <%@ include file="/messages.jsp"%>
        <decorator:body/>
    </div>

</body>
</html>
```

Sample Decorator

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
    "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">

<%@ include file="/taglibs.jsp"%>

<html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en">
<head>
    <title><decorator:title default="Equinox"/></title>
    <meta http-equiv="content-type" content="text/html; charset=utf-8"/>
    <link href="${ctx}/styles/global.css" type="text/css" rel="stylesheet"/>
    <link href="${ctx}/images/favicon.ico" rel="SHORTCUT ICON"/>
    <script type="text/javascript" src="${ctx}/scripts/global.js"></script>
    <decorator:head/>
</head>
<body<decorator:getProperty property="body.id" writeEntireProperty="true"/>>
<a name="top"></a>

    <div id="content">
        <%@ include file="/messages.jsp"%>
        <decorator:body/>
    </div>

</body>
</html>
```

Before SiteMesh



After SiteMesh

Exception Handling

- action-servlet.xml:

```
<bean id="exceptionResolver"
    class="org.springframework.web.servlet.handler.SimpleMappingExceptionResolver">
    <property name="exceptionMappings">
        <props>
            <prop key="org.springframework.dao.DataAccessException">
                dataAccessFailure
            </prop>
        </props>
    </property>
</bean>
```

- dataAccessFailure.jsp:

```
<%@ include file="/taglibs.jsp" %>

<h3>Data Access Failure</h3>

<p>${requestScope.exception.message}</p>

<p><a href="<c:url value='/'/>">&#171; Home</a></p>
```

Resources

- **Web**: www.springframework.org and forum.springframework.org
- **Print**: Spring Live, Pro Spring, Spring in Action, Professional Spring Development, Expert Spring MVC and Web Flow
- **Examples**: JPetstore, Petclinic, AppFuse Equinox

Questions?

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