Spring MVC

Banu Prakash C

Objectives

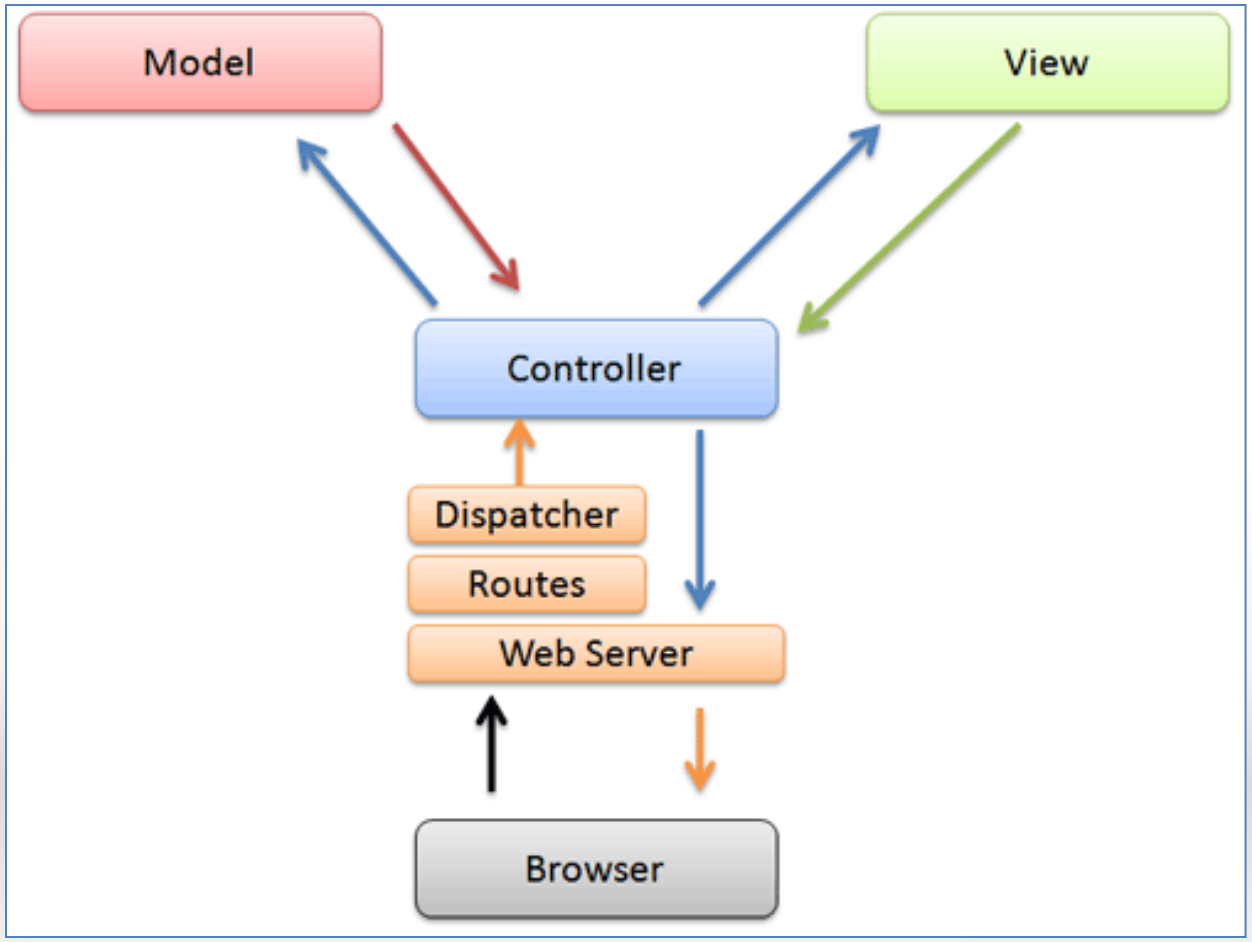
- Overview of MVC Paradigm
- Understand the components of Spring MVC
- Implementing a basic controller
- Creating a Simple view
- Configuring a Spring MVC application
- Understand Spring 3 MVC
- Annotating Controller's and RequestMapping
- Spring MVC Hibernate Integration
- Model driven attribute using @ModelAttribute
- Using Spring Validation for validating form fields
- Understand PropertyEditors for converting string type to custom data type.
- Understand how to pre populate form fields

Model View Controller (MVC)

- MVC = Model-View-Controller
  - Clearly separates business, navigation and presentation logic
  - Proven mechanism for building a thin and clean web-tier.
- Three core collaborating components
  - Controller
    - Handles navigation logic and interacts with the service tier for business logic
  - Model
    - The contract between the Controller and the View
    - Contains the data needed to render the View
    - Populated by the Controller
  - View
    - Renders the response to the request
    - Pulls data from the model

Model View Controller (MVC)

- MVC Components

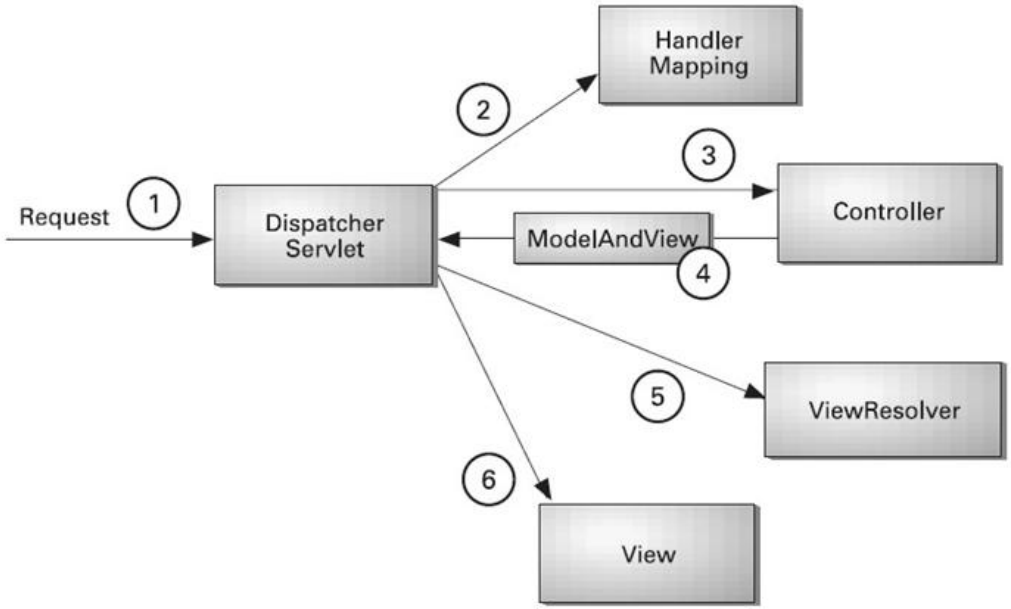


Model View Controller (MVC)

- Motivation
  - Eases maintenance burden
    - Changes to business logic are less likely to break the presentation logic
    - Changes to presentation logic also does not break business logic.
  - Facilitates multi-disciplined team development
    - Developers can focus on creating robust business code without having to worry about breaking the UI
    - Designers can focus on building usable and engaging UIs without worrying about Java
  - Use the best tool for the job
    - Java is especially suited to creating business logic code
    - Markup or template languages are more suited to creating HTML layouts.
  - Ease testability
    - Business and navigation logic are separated from presentation logic meaning they can be tested separately
    - Practically: you can test more code outside the Servlet container

- Core Components of Spring MVC
  - DispatcherServlet
    - Spring's Front Controller implementation. Request routing is completely controlled by the Front Controller. As an application developer, you will have to just configure the DispatcherServlet in web.xml
  - Controller
    - An application developer created component for handling requests.
    - Controllers are POJOs which are managed by Spring ApplicationContext just like any other bean
    - Controllers encapsulates navigation logic.
  - View
    - An application developer created pages responsible for rendering output.

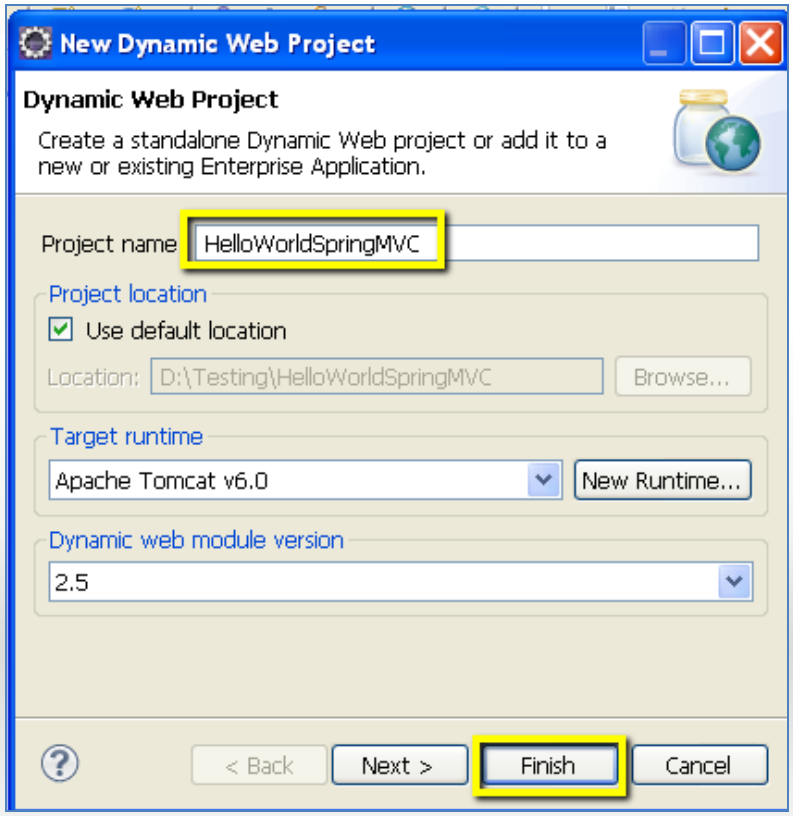
Spring MVC

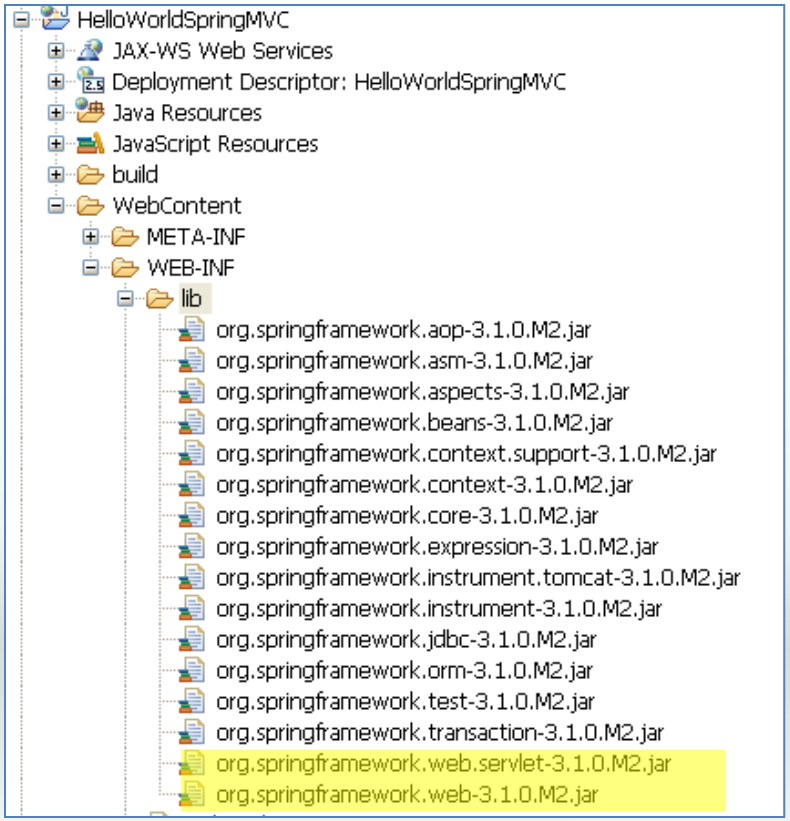


1. The DispatcherServlet first receives the request
2. The DispatcherServlet consults the HandlerMapping and invokes the Controller associated with the request
3. The Controller process the request by calling the appropriate service methods
4. The Controller returns a ModeAndView object to the DispatcherServlet. The ModeAndView object contains the model data and the view name.
5. The DispatcherServlet sends the view name to a ViewResolver to find the actual View to invoke.
6. Now the DispatcherServlet will pass the model object to the View to render the result.The View with the help of the model data will render the result back to the user

Writing your first Spring MVC Web application

- Step 1.
  - Create a Dynamic Web Project
  - Copy Spring jar files to WEB-INF\lib folder





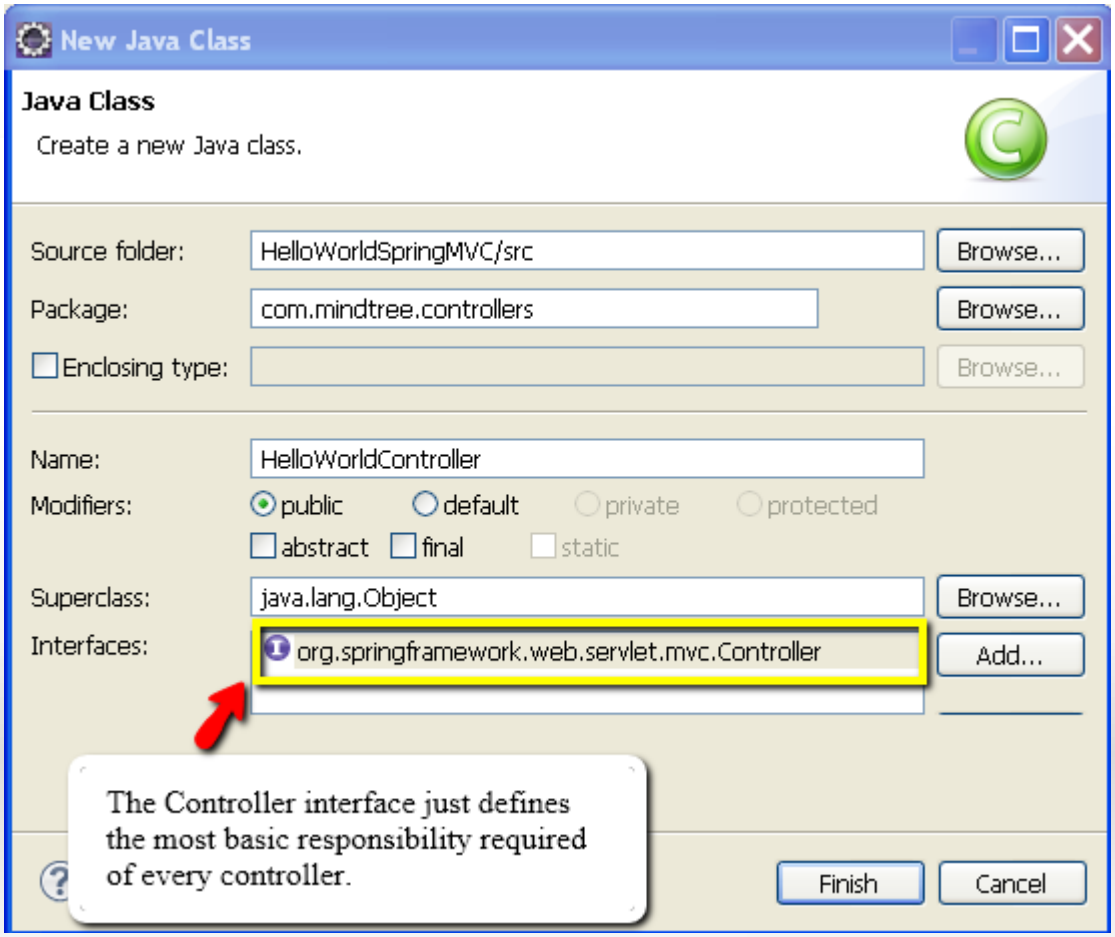
Writing your first Spring MVC Web application

- Step 2
  - Configure DispatcherServlet (FrontController).
    - Requests that you want the DispatcherServlet to handle will have to be mapped using a URL mapping in the same web.xml file.
    - We have configured all requests ending with ".view" will be handled by the 'dispatcher' DispatcherServlet.

```
<servlet>
      <servlet-name>dispatcher</servlet-name>
      <servlet-class>org.springframework.web.servlet.DispatcherServlet</servlet-class>
      <load-on-startup>1</load-on-startup>
  </servlet>

  <servlet-mapping>
      <servlet-name>dispatcher</servlet-name>
      <url-pattern>*.view</url-pattern>
  </servlet-mapping>
```

Writing your first Spring MVC Web application

- Step 3
  - Adding Controller



Writing your first Spring MVC Web application

- Step 4.
  - Coding your controller

```
/**
 * @author Banu Prakash
 * © 2011 MindTree Limited
 */
public class HelloWorldController implements Controller {
    protected final Logger logger = Logger.getLogger(getClass());
    @Override
    public ModelAndView handleRequest(HttpServletRequest request,
            HttpServletResponse response) throws Exception {
            logger.info("returning hello view with Model data");
            Map<String, Object> model = new HashMap<String, Object>();
            // populate some book list. generally this data comes from service layer
            List<String> books = new ArrayList<String>();
            books.add("Spring in Action");
            books.add("Hibernate in Action");
            books.add("Head First Java");
            // Add date and book information to model
            model.put("now", new Date());
            model.put("bookList", books);
            //return ModelAndView(viewName, modelParameterName, modelParameterValue)
            return new ModelAndView("hello", "model", model);
    }
}
```

Writing your first Spring MVC Web application

- Step 5
  - Configure the Controller class
    - Here the Servlet name is *dispatcher*. By default the *DispatcherServlet* will look for a file name *dispatcher-servlet.xml* to load the Spring MVC configuration. This file name is formed by concatenating the Servlet name ("*dispatcher*") with "*-servlet.xml*".

WEB-INF/web.xml

```
<servlet>
      <servlet-name>dispatcher</servlet-name>
      <servlet-class>org.springframework.web.servlet.DispatcherServlet</servlet-class>
      <load-on-startup>1</load-on-startup>
</servlet>
```

WEB-INF/dispatcher-servlet.xml

```
<beans xmlns="http://www.springframework.org/schema/beans"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://www.springframework.org/schema/beans
        http://www.springframework.org/schema/beans/spring-beans-3.0.xsd">

    <bean name="/HelloWorld.view" class="com.mindtree.controllers.HelloWorldController"/>
</beans>
```

BeanNameUrlHandlerMapping maps the bean name "/HelloWorld.view" to HelloWorldController

Writing your first Spring MVC Web application

- Step 6
  - Configure ViewResolver

WEB-INF/dispatcher-servlet.xml

```
<beans xmlns="http://www.springframework.org/schema/beans"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://www.springframework.org/schema/beans
        http://www.springframework.org/schema/beans/spring-beans-3.0.xsd">

    <!-- configure controller -->
    <bean name="/HelloWorld.view" class="com.mindtree.controllers.HelloWorldController" />

    <!-- configure view resolver -->
    <bean id="viewResolver"
        class=" org.springframework.web.servlet.view.InternalResourceViewResolver">
        <property name="prefix" value="/WEB-INF/pages/" />
        <property name="suffix" value=".jsp" />
    </bean>

</beans>
```

  - When the controller returns “hello” as the view name, the viewResolver adds “/WEB-INF/pages” as prefix to “hello” and adds “.jsp” as suffix.
  - The view now becomes “/WEB-INF/pages/hello.jsp”

Writing your first Spring MVC Web application

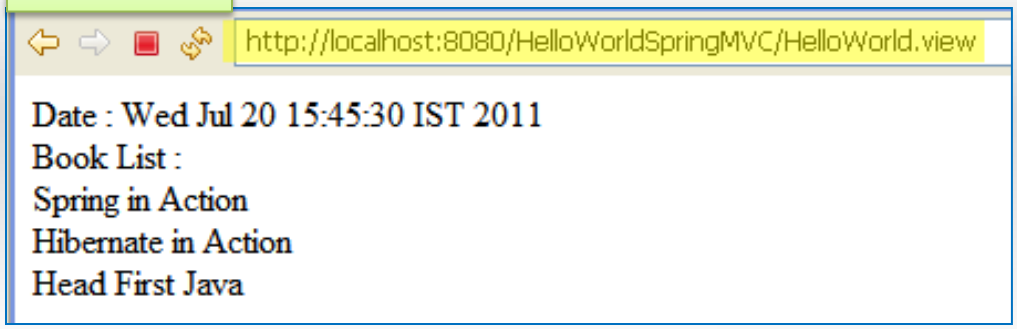
- Step 7
  - Writing view

WEB-INF/pages/hello.jsp

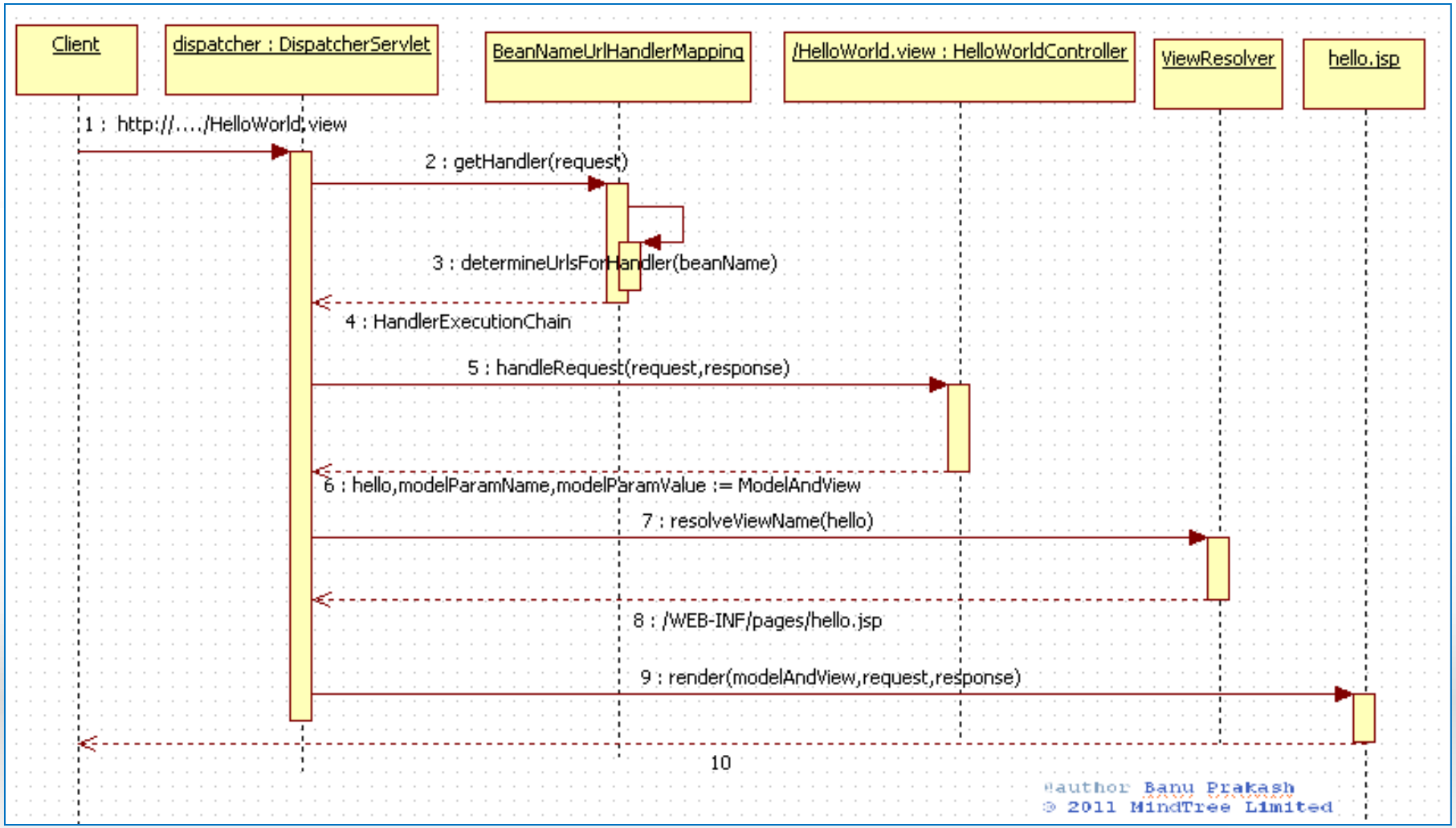
```
<body>
    Date : ${requestScope.model.now}<br />
    Book List : <br />
    <c:forEach items="${requestScope.model.bookList}" var="book">
        <c:out value="${book}" /> <br />
    </c:forEach>
</body>
```

  - The HelloWorldController returns
    - ModelAndView("hello", "model", model); where “hello” was the view name, “model” was the attribute name stored in request scope.

Browser



Sequence diagram for our HelloWorld Spring MVC



Example

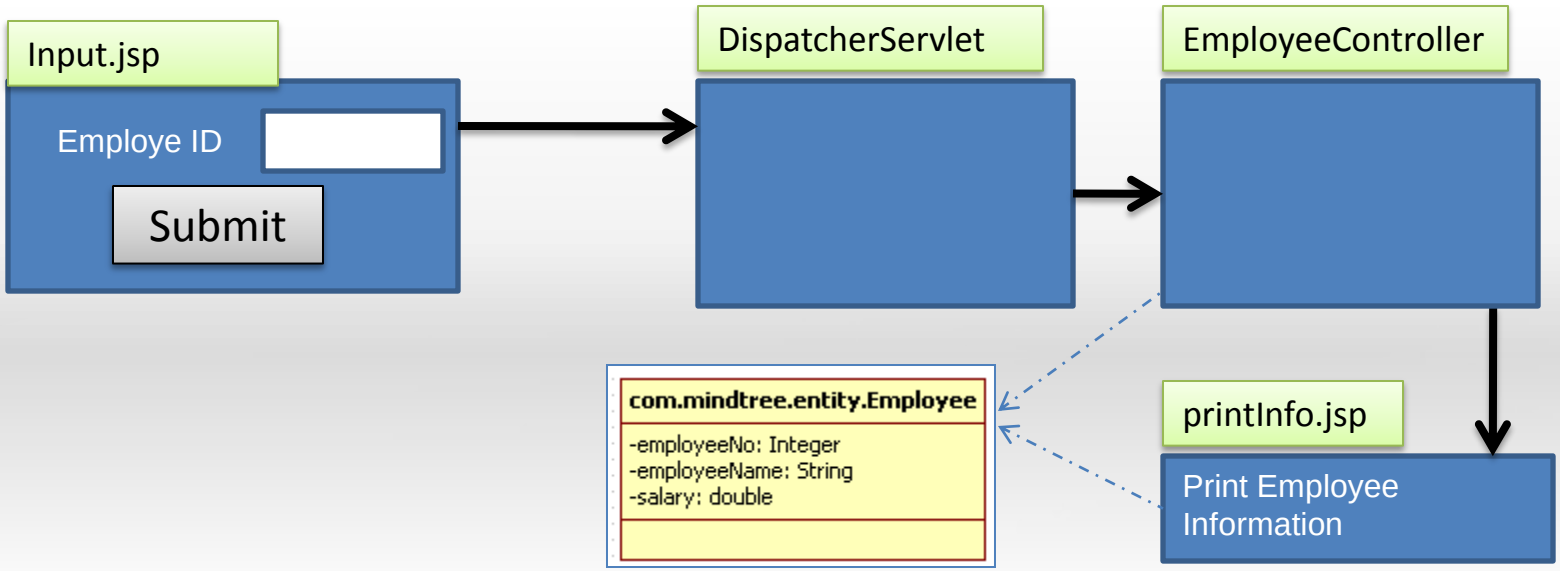
- Code Example
  - HelloWorldSpringMVC.zip
    - Example used for the presentation.
    - Illustrates creating a bare minimum Spring MVC application

Activity

Task to do

Activity

- Spring MVC Activity 1
- Write a Spring MVC application to perform the following:
  - The EmployeeController should have a map having employeeId as key and Employee instance as value
  - User should input employeeID from form field.
  - The EmployeeController should return an ModelAndView containing the Employee instance for the specified employeeID and “printInfo” as the view name.
  - The “printInfo.jsp” should print the employee information.



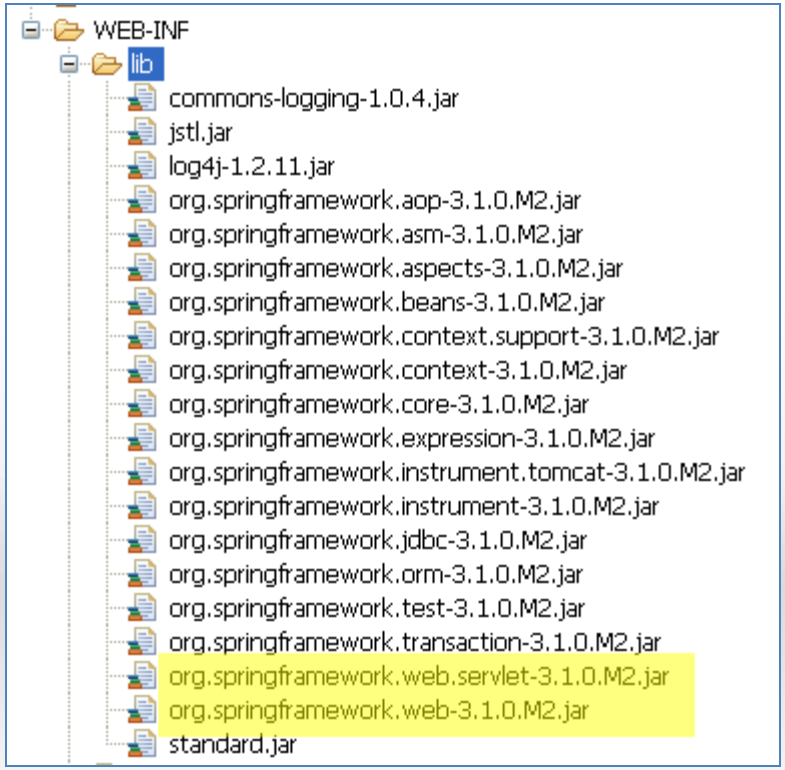
Spring MVC using annotations.

Spring version 3.x style

Spring 3 MVC

- Why Spring 3 MVC?
  - Spring 3 introduces a mvc namespace that greatly simplifies Spring MVC setup.
    - Using mvc namespace Controllers, ViewResoulvers, interceptors and resources configuration becomes that much easier.
  - No changes to the DispatcherServlet configuration in web.xml
  - Many other enhancements makes it easier to get Spring 3.x web applications up and running.

- Step 1
  - Create a Dynamic Web Project
  - Add Spring 3 Libraries to WEB-INF/lib folder



Spring libraries required for building Spring MVC application

- Step 2
  - Configure DispatcherServlet in web.xml [this remains the same for every version of spring MVC application]

```
<servlet>
    <servlet-name>dispatcher</servlet-name>
    <servlet-class>org.springframework.web.servlet.DispatcherServlet</servlet-class>
    <load-on-startup>1</load-on-startup>
</servlet>

<servlet-mapping>
    <servlet-name>dispatcher</servlet-name>
    <url-pattern>/</url-pattern>
</servlet-mapping>
```

  - The DispatcherServlet is configured as the default Servlet for the application (mapped to "/")

- Step 3
  - Configure Controllers and View Resolver

```
<beans xmlns="http://www.springframework.org/schema/beans"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xmlns:mvc="http://www.springframework.org/schema/mvc"
    xmlns:context="http://www.springframework.org/schema/context"
    xsi:schemaLocation="http://www.springframework.org/schema/beans
        http://www.springframework.org/schema/beans/spring-beans-3.0.xsd
        http://www.springframework.org/schema/context
        http://www.springframework.org/schema/context/spring-context-3.0.xsd
        http://www.springframework.org/schema/mvc
        http://www.springframework.org/schema/mvc/spring-mvc-3.0.xsd">

    <!-- Configures the @Controller programming model -->
    <mvc:annotation-driven />
    <context:component-scan base-package="com.mindtree.controllers"/>

    <!-- Forwards requests to the "/" resource to the "home" view -->
    <mvc:view-controller path="/" view-name="home" />

    <!-- Resolves view names to protected ".jsp" within the /WEB-INF/pages directory  -->
    <bean id="viewResolver"
        class=" org.springframework.web.servlet.view.InternalResourceViewResolver">
        <property name="prefix" value="/WEB-INF/pages/" />
        <property name="suffix" value=".jsp" />
    </bean>
</beans>
```

Registers the HandlerMapping required to dispatch requests to your @Controllers

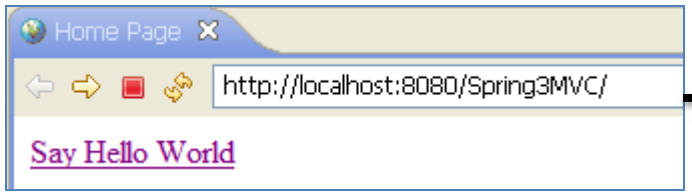
- Step 4
  - Coding your first controller using annotations

```
package com.mindtree.controllers;

import java.util.Date;

import org.springframework.stereotype.Controller;
import org.springframework.web.bind.annotation.RequestMapping;
import org.springframework.web.servlet.ModelAndView;

/**
 * @author Banu Prakash
 * © 2011 MindTree Limited
 */
@Controller
public class HelloWorldController {

    @RequestMapping("/helloWorld")
    public ModelAndView helloWorld() {
        ModelAndView mav = new ModelAndView();
        mav.setViewName("helloWorld");
        mav.addObject("message", "Hello World!");
        mav.addObject("time", new Date());
        return mav;
    }
}
```

@Controller annotation allows for auto detection of Controller

@RequestMapping("path") specifies that the method is invoked to handle the request path.

- Step 5
  - Writing views



(1)

WEB-INF/pages/home.jsp

```
<body>
    <a href="helloWorld"> Say Hello World</a>
</body>
```

(2)

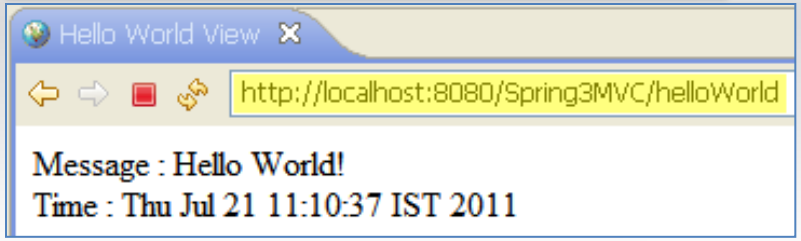
```
@Controller
public class HelloWorldController {

    @RequestMapping("/helloWorld")
    public ModelAndView helloWorld() {
        ModelAndView mav = new ModelAndView();
        mav.setViewName("helloWorld");
        mav.addObject("message", "Hello World!");
        mav.addObject("time", new Date());
        return mav;
    }
}
```

(3)

WEB-INF/pages/helloWorld.jsp

```
<body>
    Message : ${requestScope.message} <br />
    Time : ${requestScope.time}
</body>
```

Rendered output



Example

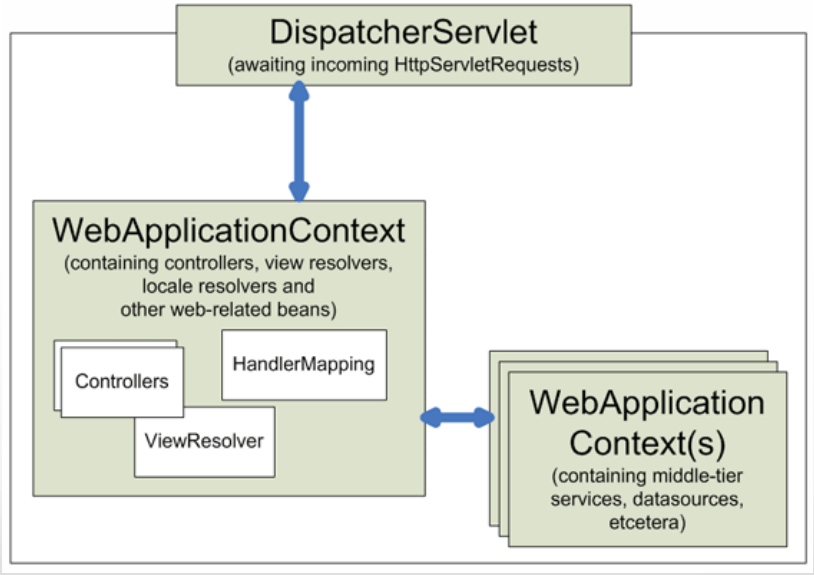
- Code Example
  - Spring3MVC.zip
    - Example code used for the presentation slides.
- Reference:
  - http://www.roseindia.net/tutorial/spring/spring3/web/spring-3-mvc-hello-world.html
    - Illustrates step by step creation of Spring MVC application

Activity

- Spring MVC Activity 2
  - Repeat the Spring MVC Activity 1using Spring 3 MVC

Spring MVC - Business Layer integration

- The WebApplicationContext is an extension of the plain ApplicationContext that has some extra features necessary for web applications



Spring MVC - Business Layer integration

- **ContextLoaderListener a servlet listener which is responsible for loading additional WebApplicationContext mostly consisting of beans for service layer and dao layer.**

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

<context-param>
    <param-name>contextConfigLocation</param-name>
    <param-value>/WEB-INF/beans.xml</param-value>
</context-param>
```

beans.xml file consists of all the Dao/Service Layer configurations as discussed in Hibernate Spring integration

- The ContextLoaderListener looks for /WEB-INF/applicationContext.xml by default, but you can override it using the context parameter contextConfigLocation as shown.

Spring MVC - Business Layer integration

- Coding the Controller to interact with service layer

```
/**
 * @author Banu Prakash
 * © 2011 MindTree Limited
 */
@Controller
public class BankController {

    @Autowired
    private BankService bankService;

    @RequestMapping("/getAccounts")
    public String getAccounts(Model model) {
        String target = "printAccounts";
        try {
            model.addAttribute("accountList",
                    bankService.getAllAccounts());
        } catch (ServiceException e) {
            model.addAttribute("errorMessage", e.getMessage());
            target = "home";
        }
        return target;
    }
}
```

Example

- Code Example:
  - Spring3MVC_Hibernate.zip
    - Illustrates integrating Spring MVC with Hibernate
    - Illustrates configuring ContextLoaderListener to create a WebApplicationContext using “beans.xml” configuration file.
    - Code fetches all accounts present in database using Hibernate API.

Mapping requests

- **Request Mapping**
  - Method Level mapping
  - **By HTTP method**
    - @RequestMapping(“path”, method=RequestMethod.GET)
    - POST, PUT, DELETE, OPTIONS, and TRACE are are also supported
  - **By presence of query parameter**
    - @RequestMapping(“path”, method=RequestMethod.GET, params=”foo”)
    - Negation also supported: params={ “foo”, “!bar” })
  - Class Level Mapping is also supported

Mapping requests

- Configuring MultiAction Controllers
  - A Single controller can handle requests for different URL's

```
@RequestMapping(value = "/addAccount", method = RequestMethod.GET)
public String getAccountForm(Model model) {
    String target = "addAccount";
    Remaining code removed for clarity
    return target;
}

@RequestMapping(value = "/addAccount", method = RequestMethod.POST)
public String addAccount(@ModelAttribute("account") Account account,
        BindingResult errorResults, Model model) {
    String target = "printAccounts";
    Remaining code removed for clarity
    return target;
}
```

For request URI of "/addAccount "and GET request, getAccountForm method is called

For request URI of "/addAccount "and POST request, addAccount method is called

Mapping requests

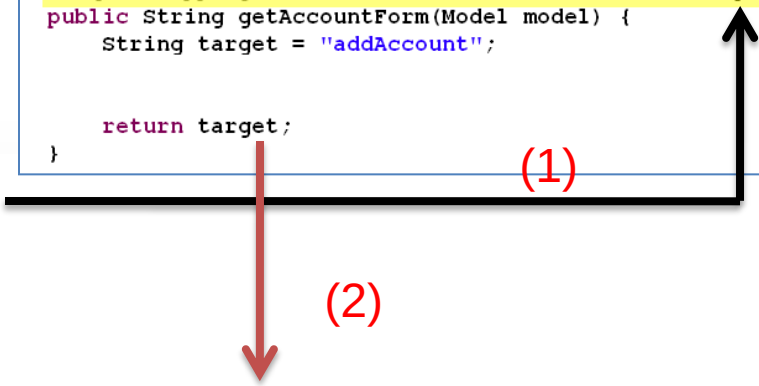
- GET request flow

home.jsp

```
<body>
    <div id="errDiv" class="errClass">
        ${requestScope.errorMessage}
    </div>
    <div id="msgDiv" class="msgClass">
        ${requestScope.message}
    </div>
    <a href="addAccount">Add a Account</a> <br />
    <a href="getAccounts">Print All Accounts</a>
</body>
```

BankController

```
@RequestMapping(value = "/addAccount", method = RequestMethod.GET)
public String getAccountForm(Model model) {
    String target = "addAccount";


    return target;
}
```



addAccount.jsp

```
<form:form method="POST"
    action="addAccount" commandName="account">
    <table>
    <tr>
        <td><form:label path="accountNumber"> Account Number</form:label></td>
        <td><form:input path="accountNumber"/></td>
        <td><form:errors path="accountNumber" cssClass="errClass"/></td>
    </tr>
    <tr>
        <td><form:label path="accountNumber"> Account Owner</form:label></td>
        <td><form:input path="accountOwner"/></td>
        <td><form:errors path="accountOwner" cssClass="errClass"/></td>
    </tr>
    <tr>
        <td><form:label path="balance">Initial Amount:</form:label></td>
        <td><form:input path="balance"/></td>
        <td><form:errors path="balance" cssClass="errClass"/></td>
    </tr>
    <tr>
        <td><input type="submit" value="Create a Account" /></td>
        <td><input type="button" value="cancel" /> </td>
    </tr>
</table>
</form:form>
```

Mapping requests

- POST request flow

addAccount.jsp

```
<form:form method="POST"
    action="addAccount" commandName="account">
    <table>
    <tr>
        <td><form:label path="accountNumber"> Account Number</form:label></td>
        <td><form:input path="accountNumber"/></td>
        <td><form:errors path="accountNumber" cssClass="errClass"/></td>
    </tr>
    <tr>
        <td><form:label path="accountNumber"> Account Owner</form:label></td>
        <td><form:input path="accountOwner"/></td>
        <td><form:errors path="accountOwner" cssClass="errClass"/></td>
    </tr>
    <tr>
        <td><form:label path="balance">Initial Amount:</form:label></td>
        <td><form:input path="balance"/></td>
        <td><form:errors path="balance" cssClass="errClass"/></td>
    </tr>
    <tr>
        <td><input type="submit" value="Create a Account" /></td>
        <td><input type="button" value="cancel" /> </td>
    </tr>
</table>
</form:form>
```

```
@RequestMapping(value = "/addAccount", method = RequestMethod.POST)
public String addAccount(@ModelAttribute("account") Account account,
        BindingResult errorResults, Model model) {
    String target = "printAccounts";


    return target;
}
```

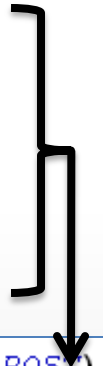
When the form is submitted, since the method of request is “POST” addAccount() is called and not getAccountForm().

Remember both addAccount() and getAccountForm() are mapped to same URI.

@ModelAttribute

- @ModelAttribute maps a model attribute to the specific, annotated method parameter.
  - This is how the controller gets a reference to the object holding the data auto-populated from request parameters entered in the form.

```
<form:form method="POST"
    action="addAccount" commandName="account">
     Account Number<form:input path="accountNumber"/> <br/>
     Account Owner<form:input path="accountOwner"/> <br />
     Initial Amount:<form:input path="balance"/> <br />
     <input type="submit" value="Create a Account" />
    <input type="button" value="cancel" />
</form:form>
```



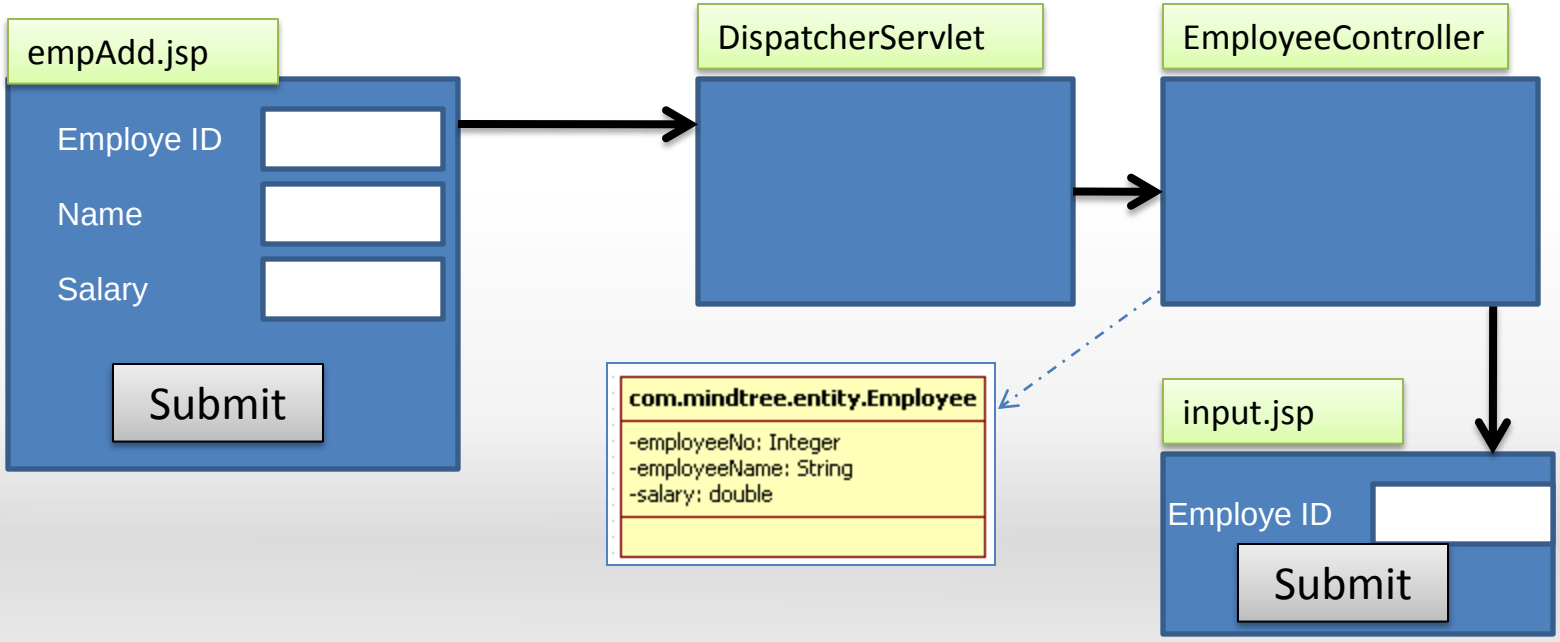
```
@RequestMapping(value = "/addAccount", method = RequestMethod.POST)
public String addAccount(@ModelAttribute("account") Account account,Model model) {
    String target = "printAccounts";
    try {
        bankService.addAccount(account);
    } catch (ServiceException e) {
        model.addAttribute("errorMessage", e.getMessage());
        target = "home";
    }
    return target;
}
```

Example

- Code Example:
  - Refer: Spring3MVC_Hibernate_CRUD.zip
    - Illustrates using @RequestMapping annotation to map a URI to a controller method
    - Illustrates using @ModelAttribute annotation to map form field data to entity class

Activity

- Activity 3
  - Modify the Activity 2 to add Employee entity to store in a map using @ModelAttribute



Validation

- **Validator interface**
  - Spring's features a Validator interface that you can use to validate objects.
  - The Validator interface works using an Errors object so that while validating, validators can report validation failures to the Errors object.
  - Methods of org.springframework.validation.Validator interface:
    - boolean supports(Class)
      - Can this Validator validate instances of the supplied Class?
    - void validate(Object, org.springframework.validation.Errors)
      - validates the given object and in case of validation errors, registers those with the given Errors object

Validation

- Validator Example

```
/**
 * @author Banu Prakash
 * © 2011 MindTree Limited
 *
 */
public class AccountValidator implements Validator {
    /* (non-Javadoc)
     * @see org.springframework.validation.Validator#supports(java.lang.Class)
     */
    @Override
    public boolean supports(Class<?>  clazz) {
        return clazz.isAssignableFrom(Account.class);
    }

    /* (non-Javadoc)
    @Override
    public void validate(Object model, Errors errors) {
         ValidationUtils.rejectIfEmpty( errors, "accountNumber",
                 "acc.No","Account Number is required");
         ValidationUtils.rejectIfEmpty( errors, "accountOwner",
                 "acc.Owner","Account Owner is required");
         ValidationUtils.rejectIfEmpty( errors, "balance",
                 "acc.Balance","Account Initial Balance is required");
         Account account = (Account) model;
         if(account.getBalance() <= 0) {
             errors.rejectValue("balance",
                     "acc.balanceInvalid",
                     "Account Initial Balance should be more than zero");
         }
    }
}
```

Validation

- BindingResult
  - Binding and validation errors can be trapped and introspected by declaring a BindingResult parameter
  - Must follow the JavaBean parameter in the method signature
  - Errors automatically exported in the model when rendering views

```
@RequestMapping(value = "/addAccount", method = RequestMethod.POST)
public String addAccount(@ModelAttribute("account") Account account,
        BindingResult errorResults, Model model) {
    String target = "printAccounts";
    try {
        validator.validate(account, errorResults);
        if (errorResults.hasErrors()) {
            target = "addAccount";
        } else {
            bankService.addAccount(account);
            model.addAttribute("accountList", bankService.getAllAccounts());
        }
    } catch (ServiceException e) {
        model.addAttribute("errorMessage", e.getMessage());
        target = "home";
    }
    return target;
}
```

Example

- Code Example:
  - Refer: Spring3MVC_Hibernate_CRUD.zip
    - Illustrates integrating with Hibernate API
    - Illustrates using @ModelAttribute to map form request parameters to entity class
    - Illustrates using Spring validation framework: Validator interface, BindingResult interface to validate form data

Activity

- Activity 4
  - Modify Activity 3 to validate employee
    - Employee should be stored in the map data of EmployeeController only if valid data is entered.
    - Validation Rules:
      - Employee ID is required and should be numeric
      - Employee Name is required and minimum 3 digits
      - Salary is required and should be greater than zero.

Type Conversion

- **PropertyEditors**
  - The java.beans.PropertyEditor interface provides a means to customize how String values are mapped to non-String types.
  - java.beans.PropertyEditorSupport is a support class to help build property editors.
  - Some important methods which has to be overridden in our PropertyEditor class are listed below:

Method	Description
void setAsText(String text)	Sets the property value by parsing a given String
String getAsText()	Gets the property value as a string suitable for presentation to a human to edit
Object getAsValue()	Gets the value of the property.

Type Conversion

- Spring Framework comes with several custom editors based on PropertyEditorSupport.
  - For Example “CustomDateEditor” is used to set a java.util.Date property from a String using a custom java.text.DateFormat object.
- **In a web application data entered from form fields are of type String, If type conversion has to happen between the entered date in the String format to a java.util.Date, you need to register explicitly using WebDataBinder.**
- Annotating controller methods with @InitBinder allows you to configure web data binding directly within your controller class

```
@InitBinder
public void initBinder(WebDataBinder binder) {
    SimpleDateFormat dateFormat = new SimpleDateFormat("dd-MM-yyyy");
    binder.registerCustomEditor(Date.class, new CustomDateEditor(
            dateFormat, true));
}
```

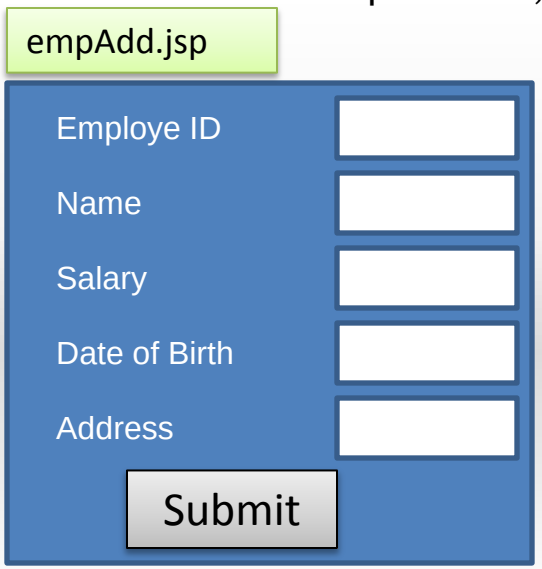
Type Conversion

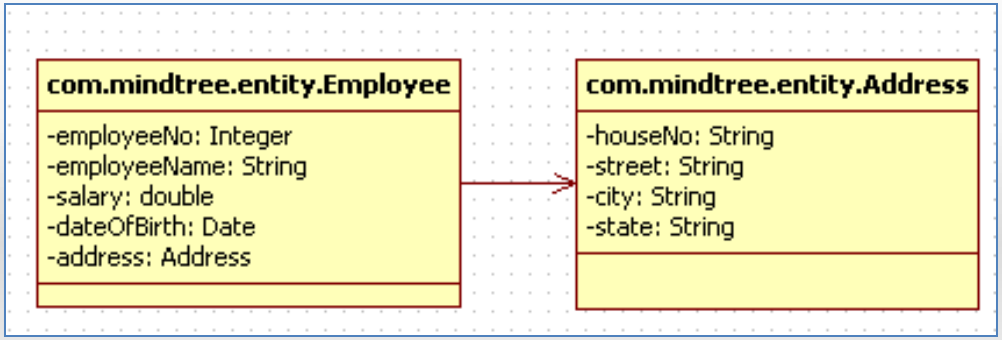
- Writing your own PropertyEditors
  - Converts data entered in the form House, Street, City to Address property

```
/**
 * @author Banu Prakash
 * © 2011 MindTree Limited
 *
 */
public class AddressEditor extends PropertyEditorSupport {
    private String[] strAddressData;
    private Address address;
    /* (non-Javadoc)
     * @see java.beans.PropertyEditorSupport#setAsText(java.lang.String)
     */
    @Override
    public void setAsText(String text) throws IllegalArgumentException {
        if( text != null) {
            strAddressData = text.split(",");
            if( strAddressData.length != 3) {
                throw new IllegalArgumentException("Address should have House No,Street,City");
            }
        } else {
            throw new IllegalArgumentException("Address should have House No,Street,City");
        }
    }

    /* (non-Javadoc)
    @Override
    public Object getValue() {
        return new Address(strAddressData[0],strAddressData[1],strAddressData[2]);
    }
```

Activity

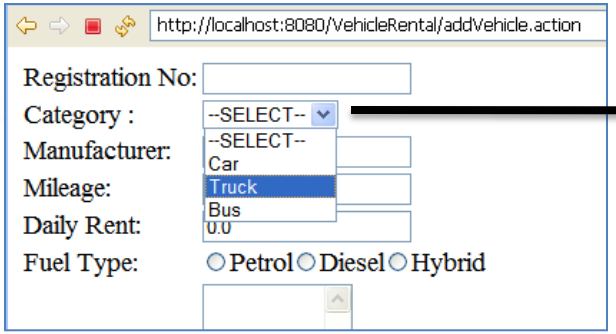
- Activity 5
  - Modify Activity 4.
    - The user interface should accept dateOfBirth and address. These data entered in form field are in the form of String data type.
    - Using WebDataBinder convert the data entered in form field for Date Of Birth to Date and data entered in address field to Address respectively.
    - Date is entered as dd-MMM-yyyy
      - Example: 10-JAN-1987
    - Address is entered in the form houseNo, street, city, state
      - Example: No: 5, I A Main Road, Yelahanka New town, Bangalore, Karnataka.





Pre-populating form fields

- Pre-populate Form Fields
  - @ModelAttribute annotated methods will be executed *before* the chosen @RequestMapping annotated handler method.




```
@Controller
public class VehicleController {

    @Autowired
    private VehicleRentalService rentalService;

    @Autowired
    private VehicleValidator validator;

    @ModelAttribute("categoryList")
    public Map<String, String> populateCategory(){
        Map<String, String> catMap = new LinkedHashMap<String, String>();
            catMap.put("Car", "Car");
            catMap.put("Truck", "Truck");
            catMap.put("Bus", "Bus");
        return catMap;
    }

    @RequestMapping(value="/addVehicle.action",
            method = RequestMethod.GET)
    public String getVehicleAddPage(Model model){
        Vehicle vehicle  = new Vehicle();
        model.addAttribute("vehicle", vehicle);
        return "addVehicle"; // InternalResourceViewResolver sends JSP
    }
```

```
<tr>
    <td>Category :</td>
    <td><form:select path="category">
            <form:option value="--SELECT--" />
            <form:options items="${categoryList}" />
        </form:select>
    </td>
</tr>
```

Example

- Code Example:
  - Spring3MVC_Vehicle_Rental_App.zip
    - A Spring MVC web application which illustrates integration with Hibernate
    - Illustrates using Validators, ResourceMapping and populating form fields
    - Illustrates implementing Open Session In View Filter design pattern.

- Add a view to display all Categories and vehicles belonging to that category
  - Note: Do not use lazy loading, absorb the difference with and without OpenSesssionInViewFilter configuration.
- Add the following Validation
  - While renting a vehicle “Returned Date” should not be before the “Booked Date”.

References

Contains the reference that will supplement the self learning and will be needed for completing the assignments & practice questions

References

- Spring MVC Documentation:
  - http://static.springsource.org/spring/docs/3.0.x/spring-framework-reference/html/mvc.html
  - http://static.springsource.org/spring/docs/2.5.x/api/org/springframework/orm/hibernate3/support/OpenSessionInViewFilter.html
- Spring MVC Tutorial
  - http://www.mkyong.com/tutorials/spring-mvc-tutorials/
- Spring Form tags
  - http://static.springsource.org/spring/docs/2.0.x/reference/spring-form.tld.html
  - http://static.springsource.org/spring/docs/3.0.x/spring-framework-reference/html/view.html
  - http://www.vaannila.com/spring/spring-form-tags-1.html
- Spring Samples:
  - https://src.springframework.org/svn/spring-samples/
  - Refer: mvc-basic/ mvc-showcase/ petcare/ jpetstore/ mvc-ajax/

Explore More!!

Never let your curiosity die!

Explore more

- Session handling
  - http://static.springsource.org/spring/docs/2.5.x/api/org/springframework/web/bind/annotation/SessionAttributes.html
  - http://www.infoq.com/articles/spring-2.5-ii-spring-mvc
  - http://static.springsource.org/spring/docs/2.5.x/reference/mvc.html
- **Spring's multipart (file upload) support**
  - http://static.springsource.org/spring/docs/2.5.x/reference/mvc.html
- Internationalization
  - http://www.mkyong.com/spring-mvc/spring-mvc-internationalization-example/

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