L5. Spring MVC (View technology)

JSPs and validation

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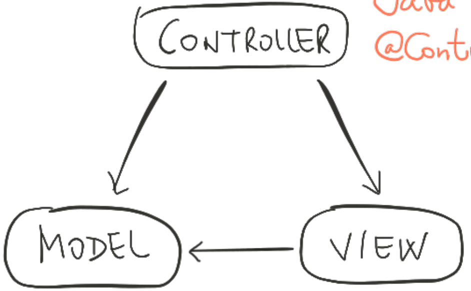
Sprint 2: developing and testing a web application

- Goal: mini project
  - agile development of a functional feature for an online shop
- This lecture:
  - JSP views
  - Fetching information from Controllers
  - Validation

Sprint 2: schedule

- Schedule: calendar on Blackboard for sessions
- Todo list:
    - week a: foundations of a web application
        - Spring MVC
        - Spring Boot
    - week b: development of more complex web pages with different views
        - Java Server Pages
        - Validation

MODEL VIEW CONTROLLER



Java class
@Controller

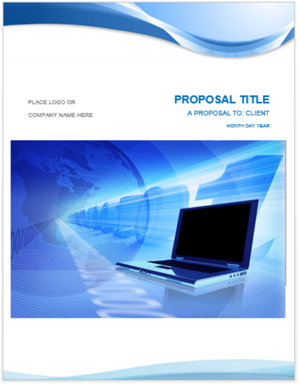
MAP
attribute ↦ value

Java Server Pages (JSPs)
- HTML
- Expression language
- Tag libraries (JSTL, Spring)

JSP Views

Views: JSPs (JavaServer Pages)

- JSP files work as templates



- The controller chooses which template to apply by name (return value)
- The view resolver (configured in WebConfig.java) resolves the template:
  - instantiates the template: fills in gaps with information from model
  - generates code

Views: JSPs (Java Server Pages)

Generation of dynamic content (HTML)

- information from model, prepared by the controller
- tag libraries for controlling generation of HTML: loops, conditions
- tag libraries for forms: to post information

Ingredients

- Expression language: to fetch attribute values from model
- JSTL (JavaServer Pages Standard Tag Library): tags to define loops and conditions
- Spring form tag library: to design web forms that integrate well with Spring MVC

Views: Expression Language (EL)

EL

- language to evaluate expressions (returning a value)
- no loops, no conditions

How to use it

- `${expr}`: outputs the result of the expression in an HTML page
  - in view example.jsp: `<p>${product.getName()}</p>`
- we can refer to model attributes

```
// in the controller class
@RequestMapping(...)
public String productDetail(@ModelAttribute("product") Product product, ... ) {
  ...
  return "example"
}
```

- difference with GStrings in Groovy: the variables in expression `expr` are fetched from the model (as opposed to be local or global variables in the Groovy script)

Views: JSTL (JavaServer Pages Standard Tag Library)

JSTL

- collection of tags
- purpose: to program UI logic (how HTML is generated)

Tag lib directive

- added at the beginning of a JSP file
- to enable using tags from a tag library
- specifies the URI of the library (identifier for the library)
- prefix to be appended to tags within the library in order to use them

```
<%@ taglib prefix="c" uri="http://java.sun.com/jsp/jstl/core" %>
```

- to use a tag

```
<p><c:out value="Hello, World!"/></p>
```

Views: JSTL (common core tags)

c:if

- evaluates an expression and displays its body content only if the expression evaluates to true

```
<c:if test="${product.getPrice() > 2000}">
   <p>Expensive product is: <c:out value="${product.getName()}"/><p>
</c:if>
```

c:choose c:when c:otherwise

- choice between a number of alternatives (like Java switch command)

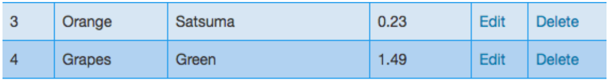
```
<c:choose>
    <c:when test="${product.getPrice() <= 10}">
       Cheap product.
    </c:when>
    <c:when test="${product.getPrice() >= 100}">
       Luxury product.
    </c:when>
    <c:otherwise>
        Affordable product.
    </c:otherwise>
</c:choose>
```

Views: JSTL (common core tags)

c:forEach

- to implement loops

```
<table>
<c:forEach items="${productList}" var="product">
<tr>
  <td><c:out value="${product.getId()}"/></td>
  <td><c:out value="${product.getName()}"/></td>
  <td><c:out value="${product.getDescription()}"/></td>
  <td><c:out value="${product.getPrice()}"/></td>
  <td><a href="/product/productDetail?productId=${product.getId()}">Edit</a></td>
  <td><a href="/product/delete?productId=${product.getId()}">Delete</a></td>
</tr>
</c:forEach>
</table>
```



3	Orange	Satsuma	0.23	Edit	Delete
4	Grapes	Green	1.49	Edit	Delete

Views: Spring Forms

spring-form tag library

- tags for including web forms in a web page
- integrate well with Spring MVC

Tag lib directive

- added at the beginning of a JSP file

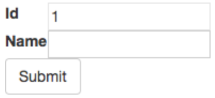
```
<%@taglib uri="http://www.springframework.org/tags/form" prefix="form"%>
```

Views: spring-form (common tags)

form:form

- http request for submitting the form:
  - action (URL)
  - HTTP method (POST)
- command object: object whose attributes can be used from a form (must be a model attribute)

```
<form:form method="POST" commandName="product"
     action="/product/add">
  <table>
  <tr>
    <td><form:label path="id">Id</form:label></td>
    <td><form:input path="id" readonly="true"/></td>
  <tr>
    <td><form:label path="name">Name</form:label></td>
    <td><form:input path="name" /></td>
  </tr>
  <tr>
    <td colspan="2">
      <input type="submit" value="Submit"/>
    </td>
  </tr>
</table>
</form:form>
```



Views: spring-form (common tags)

input tag

- renders the value of the object attribute defined as path using type='text' by default.
- other HTML5-specific types: 'email', 'tel', 'date', etc.

```
<form:input path="name" />
```

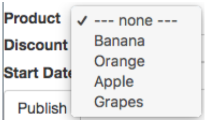
hidden tag

- tag renders an HTML 'input' tag with type 'hidden' using the bound value

```
<form:hidden path="id"/>
```

Views: spring-form (common tags)

select tag

- renders a drop-down list 

- the option tag used to define the different elements in the list

```
<form:select path="productId">
  <c:choose>
  <c:when test="${dealFormDto.getProductId() < 0}">
    <form:option value="-1" label="--- none ---"/>
  </c:when>
  </c:choose>
    <c:forEach var="item" items="${dealFormDto.getProductList()}">
      <c:choose>
        <c:when test="${dealFormDto.getProductId()==item.getId()}">
          <form:option value="${item.getId()}" label="${item.getName()}"
               selected="selected"/>
        </c:when>
        <c:otherwise>
          <form:option value="${item.getId()}" label="${item.getName()}"/>
        </c:otherwise>
    </c:choose>
  </c:forEach>
</form:select>
```

Controller

Controller

Responsibility: HTTP request handling

- links a HTTP request to a method with an annotation @RequestMapping
- method parameters: get user input
- method body: population of the model
    - business logic (access to database, computations, etc.)
    - determines view
    - interprets exceptions arisen from business logic
- return value: view name

Controller: handling HTTP requests (POST)

- RequestMapping:
    - value: http URL (form action)
    - method: http method (POST)
- Controller method:
    - @ModelAttribute: form command object

```
@RequestMapping(value = "/add", method = RequestMethod.POST)
public String productMaster(@ModelAttribute("product") Product product) { ... }
```

Form Validation

Fault prevention: Form Validation

- Report errors to users when incorrect data is provided
- To avoid crashes at runtime

Components

- Validator class for command object: method `validate()`
- Controller class: checks command object
- JSP view: error tag next to each input element

Validator class

- Registers DTO class to be validated, e.g. Student
- Reports errors using
    - ValidationUtils: methods to reject empty fields
    - class Error: input element, error code (when message defined in a file), default error message

Example: exercise 05

```
public class StudentValidator implements Validator {
  public boolean supports(Class<?> clazz) {
    return Student.class.equals(clazz);
  }
  @Override
  public void validate(Object target, Errors errors) {
    Student dto = (Student) target;

    ValidationUtils.rejectIfEmptyOrWhitespace(errors, "id", "", "Field cannot be
         empty.");

  if ((dto.getId()!=null) && (dto.getId() < 0)) {
    errors.rejectValue("id", "", "Id invalid.");
  }
}
```

Controller class

- Registers validator class
- Uses annotations
  - @Valid to enable form validation for the command object obtained from a form
  - @DateTimeFormat(pattern="dd-MM-yyyy") to specify a date format
- In handler method, logic is dependent on errors

Example: exercise 05

```
@Controller
public class IndexController {
    @InitBinder
    protected void initBinder(WebDataBinder binder) {
                binder.addValidators(new StudentValidator());
    }
    @RequestMapping(value = "/addStudent", method = RequestMethod.POST)
    public String addStudent(@Valid @ModelAttribute("student") Student student,
         BindingResult result, Model model) {
                if (!result.hasErrors() ) {
                        model.addAttribute("name", student.getName());
                        model.addAttribute("age", student.getAge());
                        model.addAttribute("id", student.getId());
                        return "form/result";
                } else
                        return "form/form";
    }
}
```

JSP view

- Shows the message error in the corresponding error tag
- Formatting can be customized using a CSS class

Example: exercise 05

```
<form:form method="POST" commandName="student" action="/addStudent">
   <table>
    <tr>
        <td><form:label path="name">Name</form:label></td>
        <td><form:input path="name" /></td>
        <td><form:errors path="name"  cssClass="error" /></td>
    </tr>
...
    <tr>
        <td colspan="2">
            <input type="submit" value="Submit"/>
        </td>
    </tr>
</table>
</form:form>
```

What's next?

Week 2

- Example project: product catalogue
- Resources from Pluralsight on JSPs: videos and examples
- Exercise 3: handling POST requests with Spring forms
- Exercise 4: implementing a master/detail interface
- Exercise 5: using validation
- Mini project checkpoint
- Lab session on Monday