

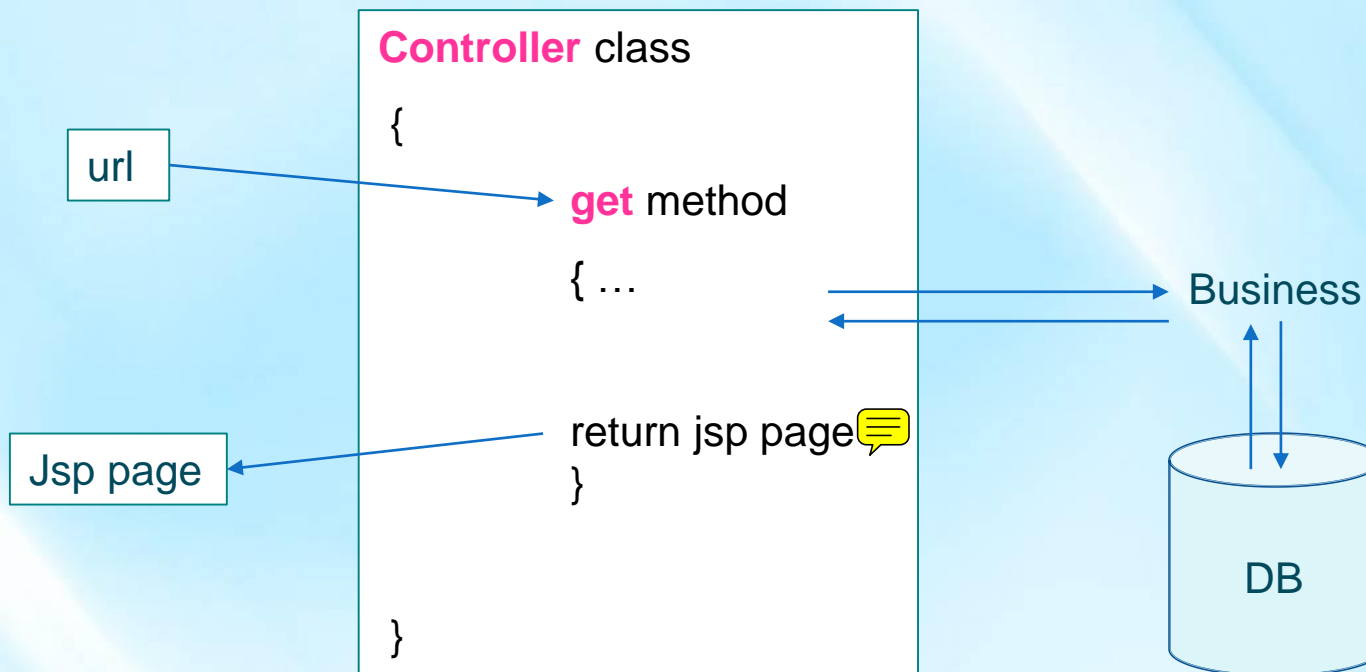
MODULE 6

CONTROLLER

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Navigation through Controller



Navigation through Controller

- ▶ Url \Rightarrow call of the get method of the corresponding controller
- ▶ Creation of a Controller class
- ▶ Get method
 - Possible call of business methods (cf Services)
 - \Rightarrow Possible access to database
 - Returns a jsp page
 - Data passed to the jsp page (through use of the Model class)

Creating a Controller

► Import

- `org.springframework.stereotype.Controller;`
- `import org.springframework.ui.Model;`
- `import org.springframework.validation.BindingResult;`
- `import org.springframework.web.bind.annotation.*;`

► Class annotation

- **`@Controller`**

► Get Method

- **`@RequestMapping (method = RequestMethod.GET)`**
- Returns the name of the jsp page

Creating a Controller

- ▶ Request path
 - Path to call the controller
 - Through annotation on controller class and/or on get method
 - **`@RequestMapping (...value = ...)`**

↓
path

Creating a Controller

- ▶ E.g.,
 - Controller

```
@Controller
@RequestMapping(value="/hello")
public class HelloController {

    @RequestMapping(value="/say", method=RequestMethod.GET)
    public String sayHello() {

        return "helloPage";
    }
}
```


Name of the jsp page

- Browser

<http://localhost:8080/first/hello/say>

Root of the project (see *application.yml*)

Query Parameter in Url

- ▶ To take input through query parameter
- ▶ For each parameter (as input of the get method)
 - **@RequestParam**
 - **required** : true/false 
 - **defaultValue** : if no value given for the parameter in the url

Query Parameter in Url

- ▶ E.g,
 - Controller

```
@Controller
@RequestMapping(value="/hello")
public class HelloController {

    @RequestMapping (value="/say", method=RequestMethod.GET)
    public String sayHello (@RequestParam(required=false, defaultValue="World!") String name)
    {
        ...
    }
}
```

- Browser

http://localhost:8080/first/hello/say

http://localhost:8080/first/hello/say?name=john

Query Parameter in Url

- ▶ If different methods to call according to the presence or absence of parameters
 - In get method declaration
 - **`@RequestMapping (... params = {...})`**
 - List of parameter names
 - Helps the DispatcherServlet to find the right method to call

Query Parameter in Url

- ▶ E.g,
 - Controller

```
@Controller
@RequestMapping(value="/hello")
public class HelloController {

    @RequestMapping (value="/say", method=RequestMethod.GET) ①
    public String sayHello ()
    { ... }

    @RequestMapping ( value="/say",                               ②
                      params={"name"},
                      method=RequestMethod.GET)
    public String sayHello (@RequestParam(required=false, defaultValue="World!") String name)
    { ... }
}
```

- Browser

http://localhost:8080/first/hello/say ①

http://localhost:8080/first/hi/say?name=John ②

Model Dictionary

- ▶ To pass model data from controller to the view (jsp page)
- ▶ By default, scope = request
 - For session scope (see module 8 Session Attribute)

Model Dictionary

- ▶ Through an object of the Model class
 - **`org.springframework.ui.Model`** class
 - Key-value pairs dictionary
 - Key (Id) : String
 - Value : object
 - To add an entry: `addAttribute("modelAttributeID",value)`
 - Input of the get method
- ▶ Use of the data
 - Data added to the model dictionary by the controller
 - Data accessed (through its id) in the jsp page
 - Syntax : **`${modelAttributeID}`**
 - See *Unified Expression Language*

Model Dictionary

- E.g,
 - Controller

```
@Controller
@RequestMapping (value="/hi")
public class HelloWorldController {

    @RequestMapping (value="/say",
                    params={"name"},
                    method=RequestMethod.GET)
    public String sayHi (@RequestParam(required=false, defaultValue="World!") final String name,
                        final Model model) {
        model.addAttribute("nameToDisplay", name);
        return "hello";
    }
}
```

Model Dictionary

- hello.jsp page

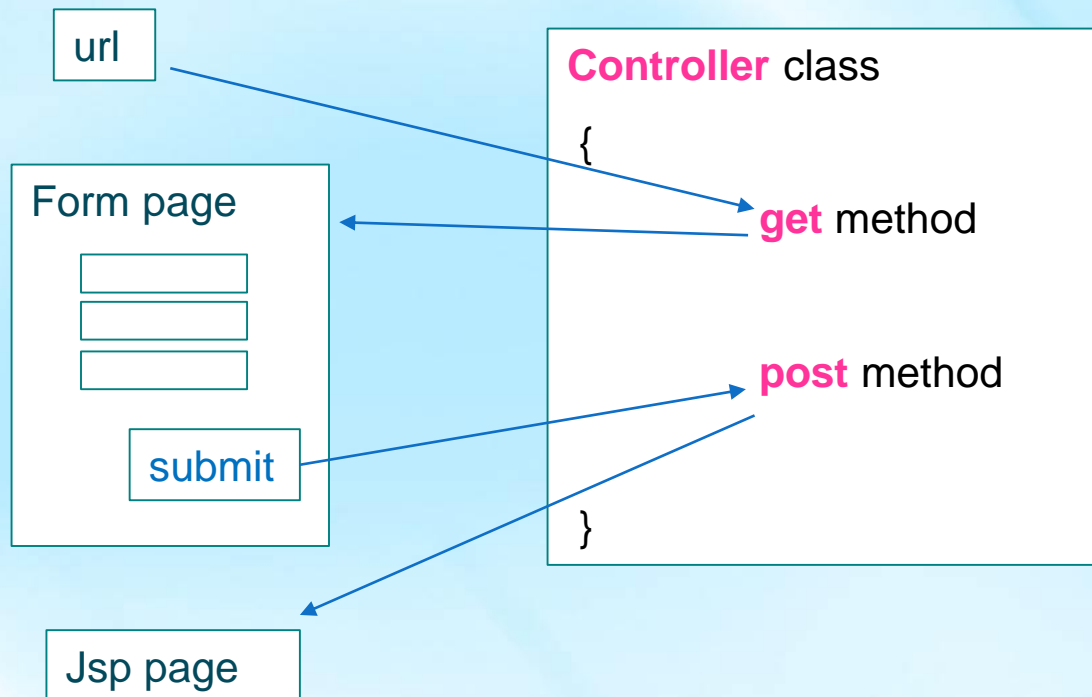
Hello \${nameToDisplay}



ID of the attribute in the model dictionary



Form Controller



Form Controller

- ▶ Form
 - Fields
 - Submit button
- ▶ Submit button \Rightarrow calls the post method of the controller class
- ▶ E.g,

Name	<input type="text"/>	Zip Code	<input type="text"/>	<input type="submit" value="Submit"/>
------	----------------------	----------	----------------------	---------------------------------------

Form Controller – *Model Class*

- ▶ Create a model class corresponding to the form
 - Each form field = a property variable (instance variable) in the class
 - Gettors/settors
- ▶ E.g,

```
public class UserForm {  
  
    private String name;  
    private Integer zipCode;  
  
    //gettors/settors  
}
```

Form Controller – *Controller Class*

- ▶ Create a controller class
- ▶ Create an instance of the form model class
 - In the get method
 - Add it to the Model dictionary

Form Controller – Controller Class

- ▶ Create a post method
 - **@RequestMapping (method = RequestMethod.POST)**
 - Pass this form model object as input for **Data Binding**
 - Use **@ModelAttribute** annotation on this input
 - Returns
 - Either a jsp page
 - Or redirection (see further)

Form Controller – Controller Class

► E.g,

```
@Controller
@RequestMapping(value="/form")
public class UserFormController {

    @RequestMapping(method=RequestMethod.GET)
    public String home(Model model) {
        model.addAttribute("userForm", new UserForm());
        return "userFormPage";
    }

    @RequestMapping(value="/userInscription", method=RequestMethod.POST)
    public String getFormData(Model model, @ModelAttribute(value="userForm") UserForm inscriptionForm) {
        String welcomeMessage = "Welcome, " + inscriptionForm.getName()+ " !";
        model.addAttribute("message", welcomeMessage);
        return "userFormPage";
    }
}
```

→ Add a form model object to the model dictionary

↓
Property values of inscriptionForm can be automatically filled with values entered by the user through the form thanks to Data Binding

Form Controller – Jsp Page

- ▶ Create a form jsp page
- ▶ Tag library

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

- ▶ Tag : **form**
 - **method**
 - Post
 - **action**
 - Path to call the post method (cf value of the **@RequestMapping**)
 - **modelAttribute**
 - Id of the model object corresponding to the form in the Model dictionary

Form Controller – Jsp Page

► Data binding

- To automatically link value from fields (of jsp form) to properties of the model
- In field tag (<form:label>, <form:input> ...)
 - **path** : corresponding property name (instance variable) of the model class

Form Controller – Jsp Page

► E.g,

```
<form:form id="inscription"
  method="POST"
  action="/first/form/userInscription"
  modelAttribute="userForm">
  <form:label path="name"> Name </form:label>
  <form:input path="name"/>

  <form:label path="zipCode"> Zip Code </form:label>
  <form:input path="zipCode"/>

  <form:button>Submit</form:button>

  <c:if test="${not empty message}"> ${message} </c:if>
</form:form>
```

If "/first" is the root of the project

Cf **name** property of UserForm

Cf **zipCode** property of UserForm

⇒ Data Binding :

The *name* and *zipCode* properties of the *inscriptionForm* object model are automatically filled by values entered by the user

Form Controller

- ▶ If only one get/post method in a controller class
 - ⇒ In Controller
 - No need of value attribute for `@RequestMapping` in post/get method
 - ⇒ In jsp page
 - No need of action attribute in form tag

Redirection

- ▶ Output of the get/post method
 - Either a jsp pag
 - Or redirection
- ▶ Redirection
 - To an url
 - ⇒ calls the get method of a **controller**
- ▶ Syntax
 - **redirect** : path

Redirection

► E.g,

```
@Controller
@RequestMapping(value="/login")
public class LoginController {

    @RequestMapping(method=RequestMethod.GET)
    public String home(Model model) {

        ...
        return "loginPage";
    }

    @RequestMapping(method=RequestMethod.POST)
    public String verifyLogin(Model model , ...)
    { ...
        if (...) // if login OK
        { ...
            return "redirect:/index";
        }
        else return "LoginPage";
    }
}
```

Jsp page ←

Call of a controller ←

Jsp page ←

Unified Expression Language

- ▶ Unified Expression Language (UEL)
 - Syntax to interact with beans
- ▶ In Web pages :
 - **`${scope.expression}`**
 - Where scope is optional

Unified Expression Language

► Scopes in UEL

- **applicationScope**
 - A Map of the application scope attribute values, keyed by attribute name
- **requestScope**
 - A Map of the request attributes for this request, keyed by attribute name
- **sessionScope**
 - A Map of the session attributes for this request, keyed by attribute name
- **view**
 - The root UIComponent in the current component tree for this request
- **cookie**
 - A Map of the cookie values for the current request, keyed by cookie name
- **facesContext**
 - The FacesContext instance for the current request

Unified Expression Language

- ▶ **Scopes in UEL (continue)**
 - **Header**
 - A Map of HTTP header values for the current request, keyed by header name
 - **headerValues**
 - A Map of String arrays containing all the header values for HTTP headers in the current request, keyed by header name
 - **initParam**
 - A Map of the context initialization parameters for this web application
 - **Param**
 - A Map of the request parameters for this request, keyed by parameter name
 - **paramValues**
 - A Map of String arrays containing all the parameter values for request parameters in the current request, keyed by parameter name

Unified Expression Language

- ▶ Use UEL in web pages to access data passed from controller
 - Data passed through the model dictionary
- ▶ Access to an object from the model dictionary thanks to its key

`${objectModelKey}`

▶ E.g,

- Controller :

```
String message = "Hello";  
model.addAttribute("messageID",message);
```

- Jsp page :

`${messageID}`

Unified Expression Language

- ▶ To access a property of an object from the model dictionary

`${objectModelKey.property}`

- If property is **private** and **public getter** exists in the class of the object
- E.g,

Model class :

ModelClass
private String name public getName()

Controller: `model.addAttribute("modelObjectID", new ModelClass())`

Jsp page : **`${modelObjectID.name}`**

Unified Expression Language

- ▶ E.g,
 - If *ModelClass* has a private property called *user* (with public getter) which is a reference to an object of the *Person* class
 - and if *Person* class has a private property called *name* (with public getter)



⇒ In jsp : `${modelObjectID.user.name}`

Unified Expression Language

- ▶ To link Web page components to a collection (list, array,...)

`${ ...list[i] }`

- E.g,
 - If *ModelClass* has a private property called *persons* (with public getter) which is an ArrayList of objects from the *Person* class



⇒ In jsp : **`${modelObjectID.persons[2].name}`**

Unified Expression Language

- ▶ To link Web page components to a hash map

`${ ...hashMap['idValue'] }`

- E.g,

- If *ModelClass* has a private property called *personsMap* (with public getter) which is an *HashMap* of objects from the *Person* class

⇒ In jsp : `${modelObjectID. personsMap['id234'].name}`

Unified Expression Language


Other UEL operators

- ▶ Arithmetic
 - +, -, *, /, div, %, mod
- ▶ Logical
 - and, &&, or, ||, not, !
- ▶ Relational
 - ==, eq, !=, ne, <, lt, >, gt, <=, ge, >=, le
- ▶ Empty
 - To determine whether a value is null or empty
- ▶ Conditional
 - A ? B : C.
 - Evaluate B or C, depending on the result of the evaluation of A

Unified Expression Language

- ▶ The precedence of operators
 - []
 - () (used to change the precedence of operators)
 - - (unary) not ! Empty
 - * / div % mod
 - + - (binary)
 - < > <= >= lt gt le ge
 - == != eq ne
 - && and
 - || or
 - ? :

JSTL

- ▶ JavaServer Pages Standard Tag Library (JSTL)
 - Collection of tags to encapsulate core functionality 
 - Support for common, structural tasks
 - such as iteration, conditionals, ...
- ▶ To include JSTL Core library
 - Usually prefix="c"
 - uri="http://java.sun.com/jsp/jstl/core"

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

JSTL

if

```
<c:if test = " ... " >
```

```
...
```

```
</c:if>
```

- ▶ *N.B. No else !*
- ▶ *E.g,*

```
<c:if test="{not empty message}"> {message} </c:if>
```

```
<c:if test="{user.name=='guest'}"> Welcome, guest! </c:if>
```

JSTL

choose

```
<c:choose>
  <c:when test = " ... " >
    ...
  </c:when>
  <c:when test = " ... " >
    ...
  </c:when>
  ...
  <c:otherwise >
    ...
  </ c:otherwise >
</c:choose>
```


JSTL

forEach

Objects Collection
↑
`<c:forEach items = "Y" var = "X" >`
... `${X}` ...
`</c:forEach >`

E.g, on an **ArrayList**

ArrayList<Category>
↑
`<c:forEach items="${allCategories}" var="category">`
 `${category.name}`
`</c:forEach>`

Category

```
private String name  
public getName()
```

JSTL

forEach

E.g, on a **hashmap**

```
<c:forEach items="${school.students}" var="item">  
    ${item.value.name}  
</c:forEach>
```

Key Value
↑ ↑
HashMap<Integer, Student>

Student

```
private String name  
public getName()
```

JSTL

set

```
<c:set
```

```
  var = "..."
```



Name of the variable

```
  scope= "..."
```



Scope of the variable

```
  value = "..."
```



Value of the variable

```
>
```

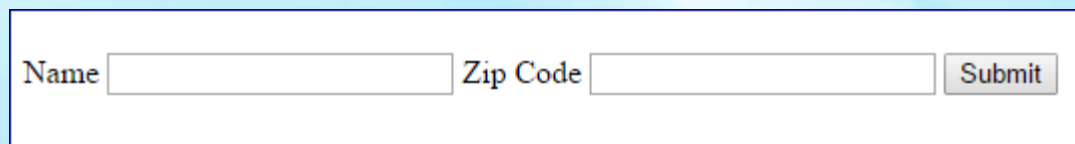
► Scope

- page
- request
- session
- application

Form Validation

- ▶ To validate data entered by the user in the form

- ▶ E.g,



A screenshot of a web form. It contains two text input fields. The first field is preceded by the label 'Name' and the second by 'Zip Code'. To the right of the second input field is a button labeled 'Submit'.

- *Name*
 - *From 3 to 30 characters*
- *Zip code*
 - *Not empty number*
 - *Value between 1000 and 9999*

Form Validation – *pom.xml*

- ▶ *Add a dependency*

```
<dependency>  
    <groupId>org.hibernate</groupId>  
    <artifactId>hibernate-validator</artifactId>  
</dependency>
```

Form Validation – *Model Class*

- ▶ Through annotations in the Model class
- ▶ Import
 - `import javax.validation.constraints.*;`
- ▶ Annotations to properties (instance variables)

<http://docs.oracle.com/javaee/6/api/javax/validation/constraints/package-summary.html>

- **@NotNull** : mandatory property
- **@Size** : number of characters (for **strings**)
 - **min** attribute / **max** attribute
- **@Min** / **@Max** : minimum / maximum value allowed for **numbers**
 - **value** attribute

Form Validation – *Model Class*

► E.g,

```
public class UserForm {  
  
    @Size(min=3, max=30)  
    private String name;  
  
    @NotNull  
    @Min(value=1000)  
    @Max(value=9999)  
    private Integer zipCode;  
  
    //getters/settors  
}
```

Form Validation – Controller Class

► Import

- `import javax.validation.Valid;`
- `import org.springframework.validation.BindingResult;`

► Post method

- Inputs :
 - Use **@Valid** annotation on form Model object
 - Add **BindingResult** as input

Form Validation – Controller Class

► E.g,

```
@Controller
@RequestMapping(value="/form")
public class UserFormController {

    ... // get method

    @RequestMapping(value="/userInscription", method=RequestMethod.POST)
    public String getFormData(Model model,
        @Valid @ModelAttribute(value="userForm") UserForm inscriptionForm,
        final BindingResult errors) {
        String welcomeMessage;
        if (!errors.hasErrors())
            welcomeMessage = "Welcome, " + inscriptionForm.getName() + " !";
        else welcomeMessage = "Sorry, the form is not valid!";
        model.addAttribute("message", welcomeMessage);
        return "userFormPage";
    }
}
```

Form Validation – *Jsp Page*

- ▶ Specify where to display the error messages
 - Tag
 - **<Form:error >**
 - Attribute
 - **path** : id of the corresponding field

Form Validation – Jsp Page

► E.g,

```
<form:form id="inscription" method="POST"
  action="/first/form/userInscription"
  modelAttribute="userForm">
  <form:label path="name"> Name </form:label>
  <form:input path="name"/>
  <form:errors path="name"/>
  <br>
  <form:label path="zipCode"> Zip Code </form:label>
  <form:input path="zipCode"/>
  <form:errors path="zipCode"/>
  <br>
  <form:button>Submit</form:button>
  <br>
  <c:if test="${not empty message}"> ${message} </c:if>
</form:form>
```

Error messages to display