MODULE 6

CONTROLLER

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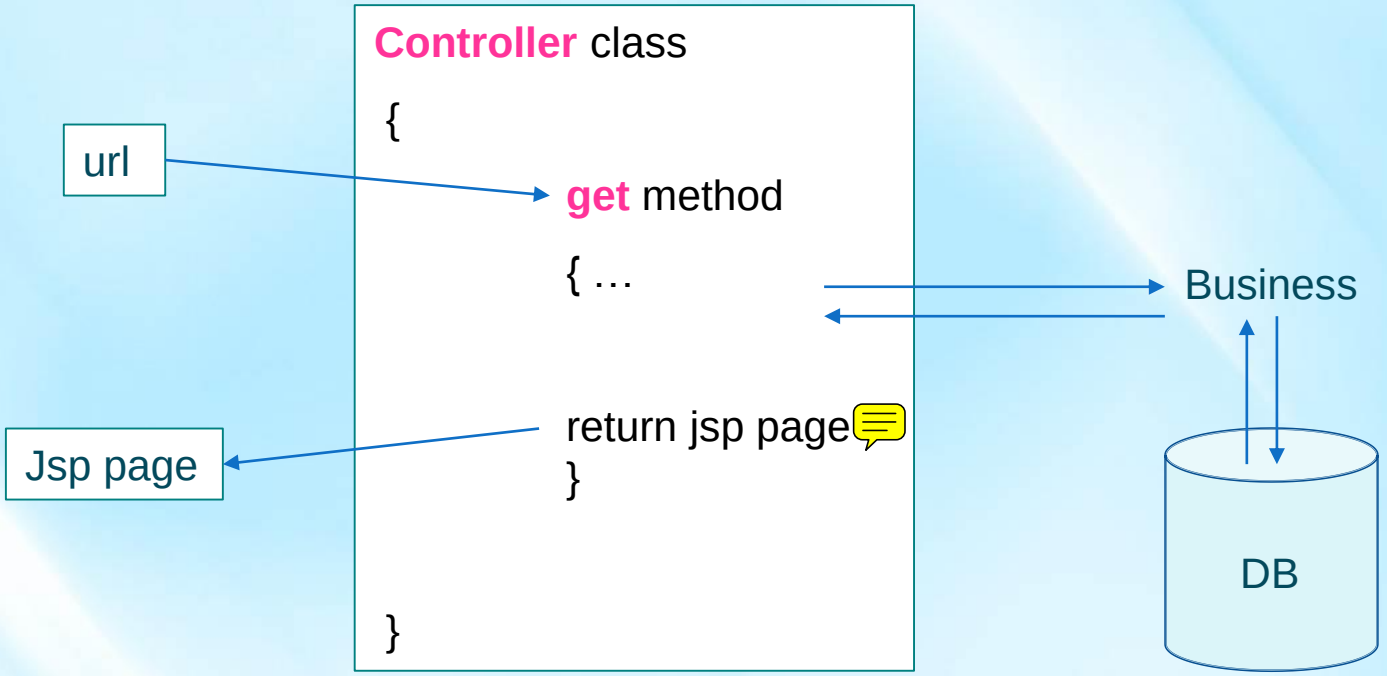
Navigation through Controller



Navigation through Controller

- Url ⇨ call of the get method of the corresponding controller
- Creation of a Controller class
- Get method
  - Possible call of business methods (cf Services)
    - ⇨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 = …)***

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(requi=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*

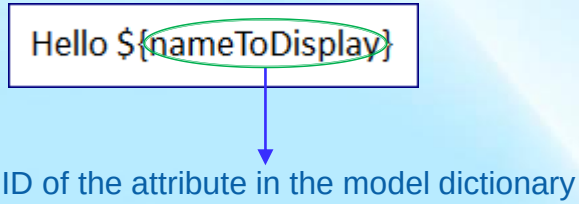
Model Dictionary

- E.g,
  - Controller

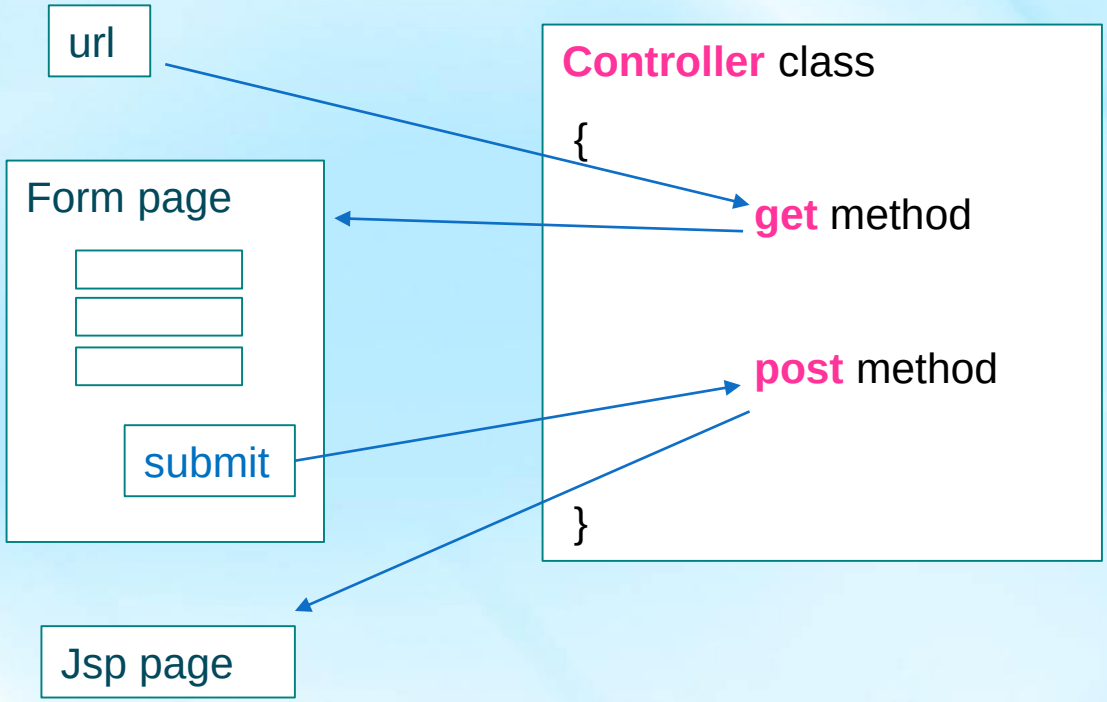
```
@Controller
@RequestMapping (value="/hi")
public class HelloWorldController {

        @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

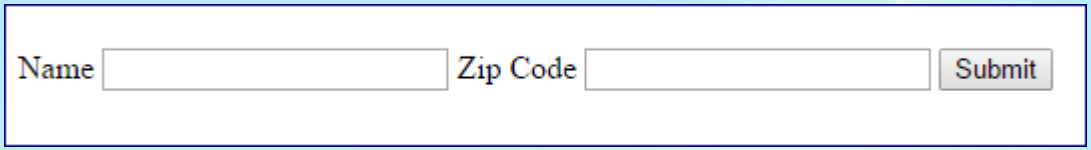


Form Controller



Form Controller

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



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 dictionnary

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 "LoginErrorPage";
        }
}
```

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}

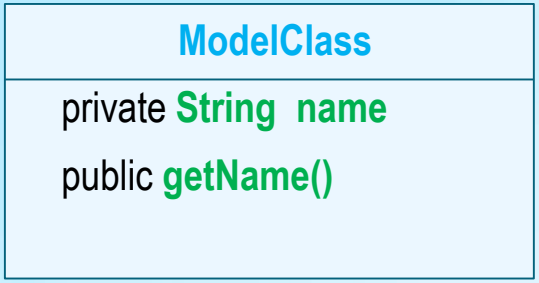
Unified Expression Language

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

  ${objectModelKey.property}

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

    Model class :



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 gettor) which is a reference to an object of the *Person* class
  - and if *Person* class has a private property called *name* (with public gettor)

⇨ **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 gettor) 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 gettor) 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**

Key Value

HashMap<Integer,Student>

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

        ${item.value.name}

</c:forEach>
```

Student
private String name
public getName()

JSTL

set

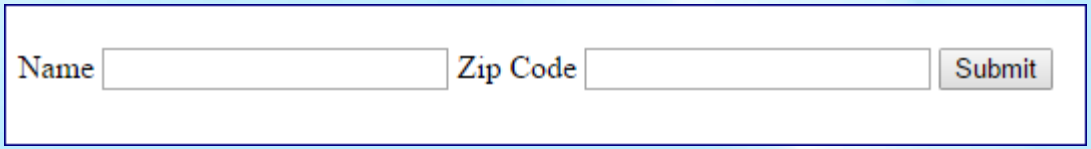
```
<c:set
  var = "…"
  scope= "…"
  value = "…"
>
```

- 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,



  - *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;

        //gettors/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