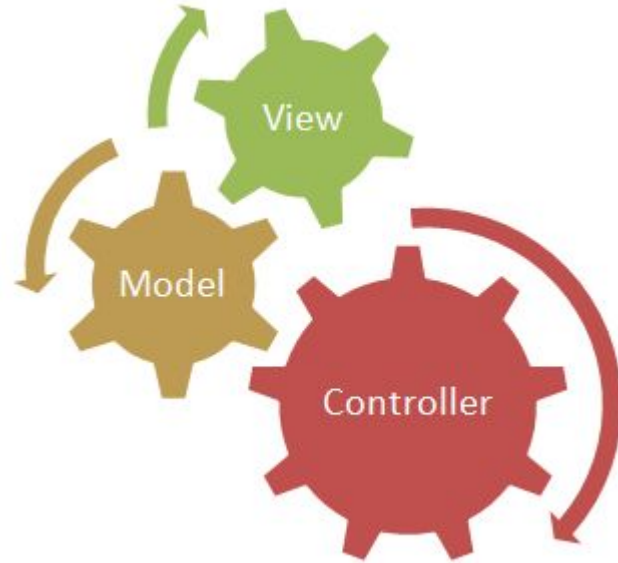


Backend:



Java D3 Mentoring Program BY/RU/KZ

April, 2017



Dzianis Kashtsialian

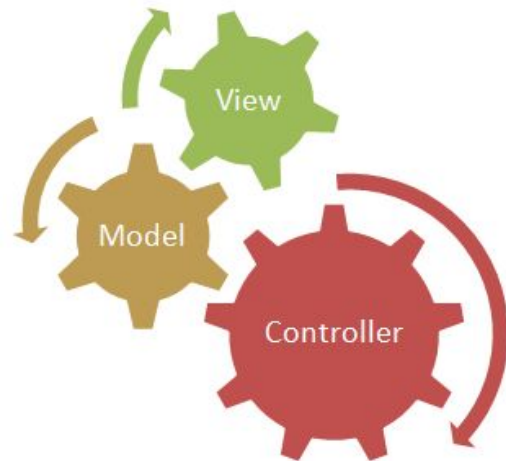
Lead Software Engineer

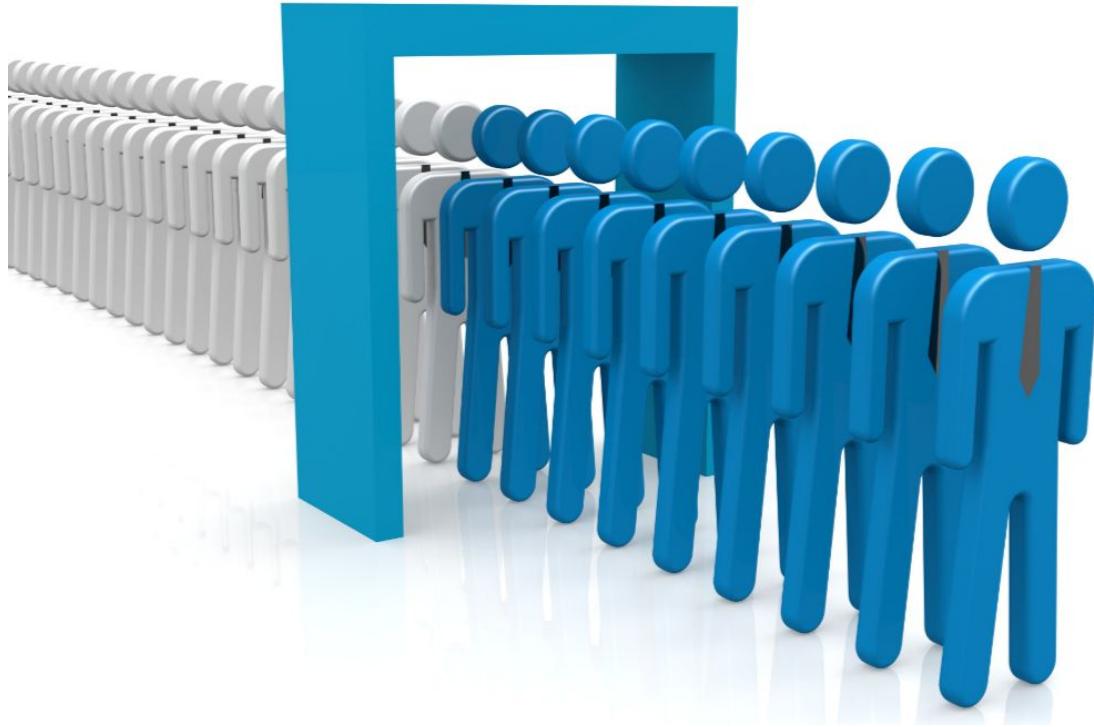
9+ years experience on <epam>

JMP Curator & Mentor

AGENDA

- 1 [MVC and Spring MVC](#)
- 2 [DispatcherServlet / Controller / View / Model](#)
- 3 [Internationalization\(i18n\) / Themes / Templates \(Apache Tiles\)](#)
- 4 [Mapping of URLs, Validation support \(JSR-349\)](#)
- 5 [File Upload Handling](#)
- 6 [Supporting Servlet 3.0 Code-Based \(Java-Based\) Configuration](#)
- 7 [Handling Exceptions](#)
- 8 [Spring MVC and Spring security](#)
- 9 [Spring MVC Workshop](#)

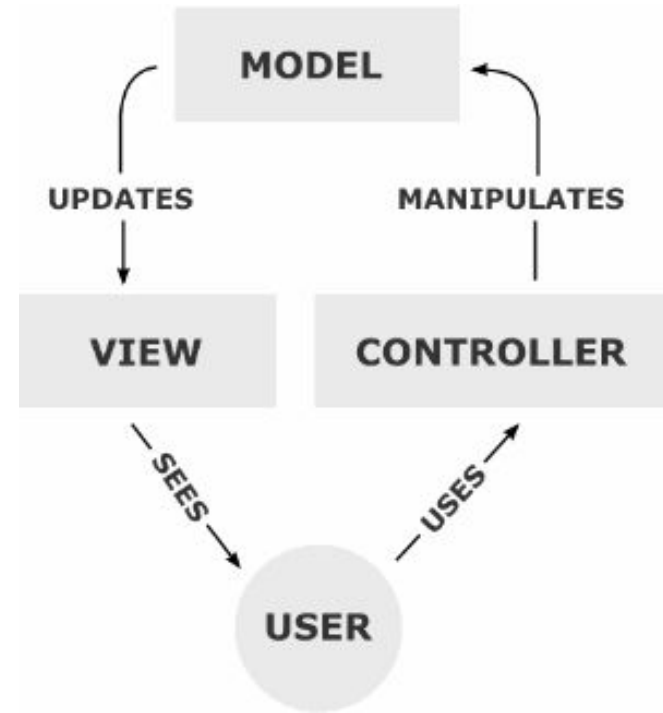
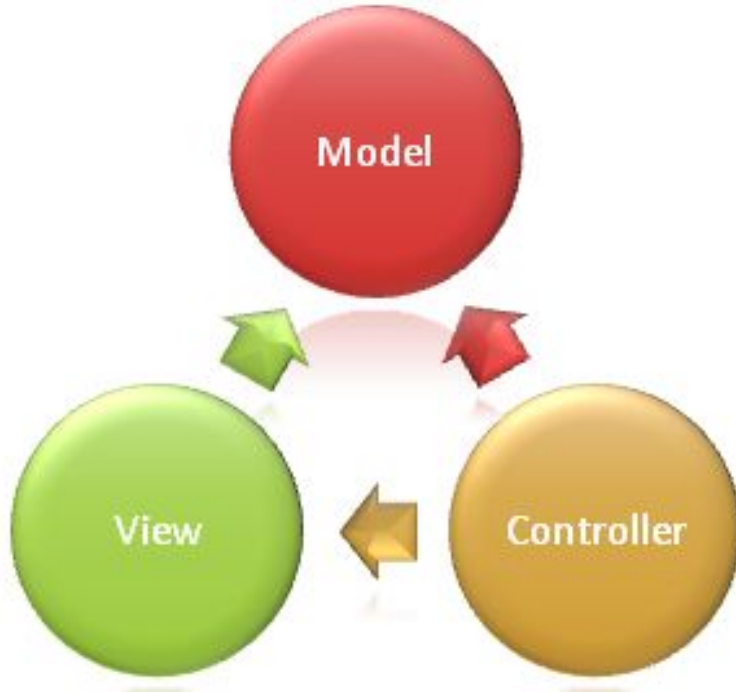




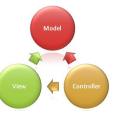
INTRODUCING MVC AND SPRING MVC

Introducing MVC and Spring MVC

What is MVC?



Introduction to Web Spring MVC



Main features

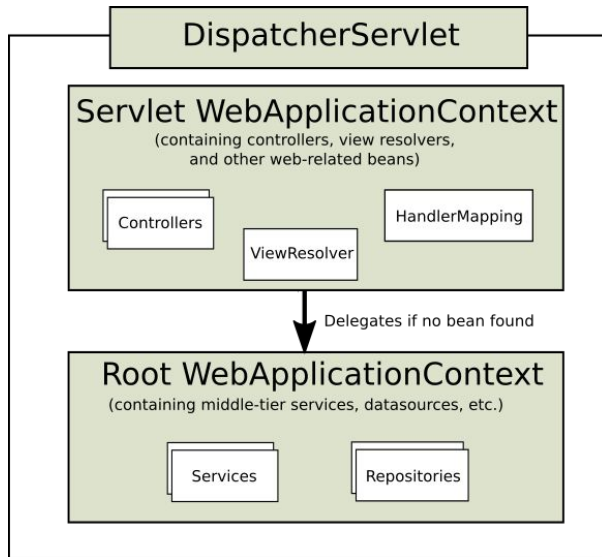
- Spring MVC provides a clear separation between a model, view and controller
- Provides both XML-based and annotation-based approaches.
- Enriched by Spring application context.
- Provides a broad range of pre-configured facilities.
- Takes convention over configuration approach.
- Uses open-close principle.

Benefits

- Decoupling views and models
- Reduces the complexity of your design
- Makes code more flexible
- Makes code more maintainable

Introducing MVC and Spring MVC

Spring MVC WebApplicationContext Hierarchy



- ▼ spring
 - ▼ training
 - training-servlet.xml
 - root-servlet.xml
 - > views
 - web.xml

```
<!-- The definition of the Root Spring Container shared by all Servlets  
and Filters -->
```

```
<context-param>  
  <param-name>contextConfigLocation</param-name>  
  <param-value>/WEB-INF/spring/root-servlet.xml</param-value>  
</context-param>
```

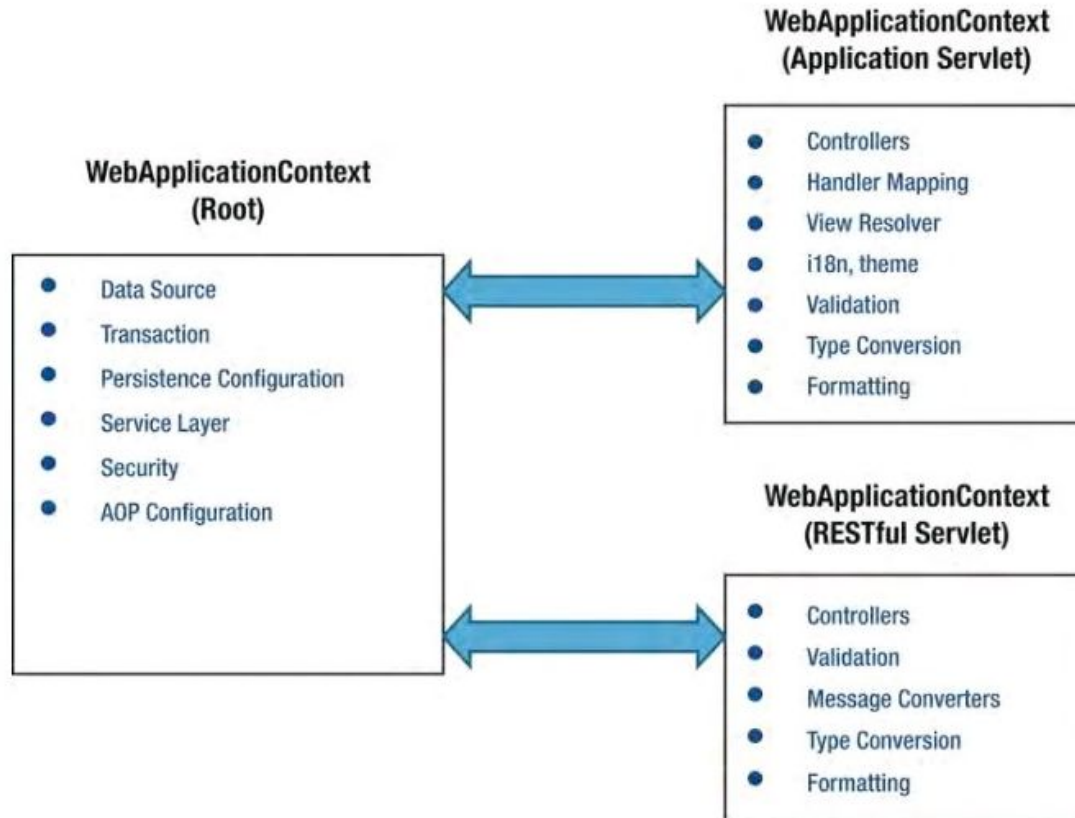
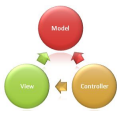
```
<!-- Processes application requests -->
```

```
<servlet>  
  <servlet-name>training</servlet-name>  
  <servlet-class>org.springframework.web.servlet.DispatcherServlet</servlet-class>  
  <init-param>  
    <param-name>contextConfigLocation</param-name>  
    <param-value>/WEB-INF/spring/training/training-servlet.xml</param-value>  
  </init-param>  
  <load-on-startup>1</load-on-startup>  
  <multipart-config>  
    <max-file-size>5000000</max-file-size>  
  </multipart-config>  
</servlet>
```

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

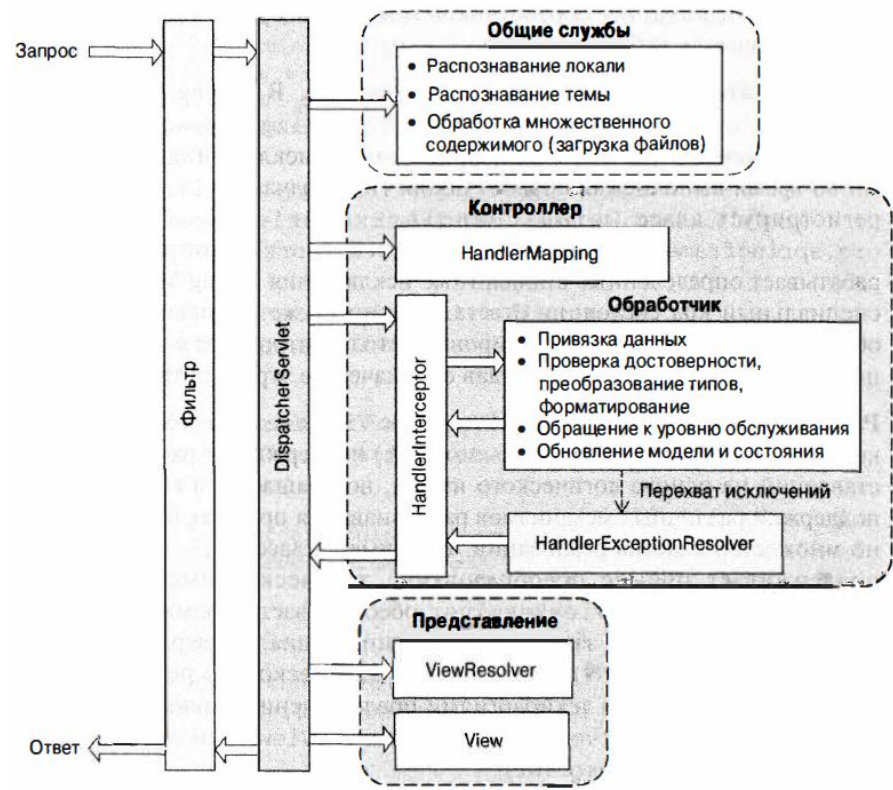
Introducing MVC and Spring MVC

Spring MVC `WebApplicationContext` Hierarchy



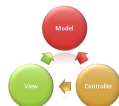
Introducing MVC and Spring MVC

Spring MVC Request Life Cycle



Introducing MVC and Spring MVC

Intercepting requests with a HandlerInterceptor



```
<beans>
  <bean id="handlerMapping"
    class="org.springframework.web.servlet.mvc.method.annotation.RequestMappingHandlerMapping">
    <property name="interceptors">
      <list>
        <ref bean="officeHoursInterceptor"/>
      </list>
    </property>
  </bean>

  <bean id="officeHoursInterceptor"
    class="samples.TimeBasedAccessInterceptor">
    <property name="openingTime" value="9"/>
    <property name="closingTime" value="18"/>
  </bean>
</beans>
```

```
package samples;

public class TimeBasedAccessInterceptor extends HandlerInterceptorAdapter {

    private int openingTime;
    private int closingTime;

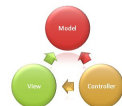
    public void setOpeningTime(int openingTime) {
        this.openingTime = openingTime;
    }

    public void setClosingTime(int closingTime) {
        this.closingTime = closingTime;
    }

    public boolean preHandle(HttpServletRequest request, HttpServletResponse response,
        Object handler) throws Exception {
        Calendar cal = Calendar.getInstance();
        int hour = cal.get(HOUR_OF_DAY);
        if (openingTime <= hour && hour < closingTime) {
            return true;
        }
        response.sendRedirect("http://host.com/outsideOfficeHours.html");
        return false;
    }
}
```

Introducing MVC and Spring MVC

Spring MVC Request Life Cycle

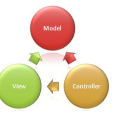


```
<!-- Resolves views selected for rendering by @Controllers to .jsp resources
in the /WEB-INF/views directory -->
<beans:bean class="org.springframework.web.servlet.view.UrlBasedViewResolver"
id="tilesViewResolver">
<beans:property name="viewClass"
value="org.springframework.web.servlet.view.tiles3.TilesView" />
</beans:bean>
```

- BeanNameViewResolver
- FreeMarkerViewResolver
- InternalResourceViewResolver
- JasperReportsViewResolver
- ResourceBundleViewResolver
- UrlBasedViewResolver
- VelocityLayoutViewResolver
- VelocityViewResolver
- XmlViewResolver
- XsltViewResolver

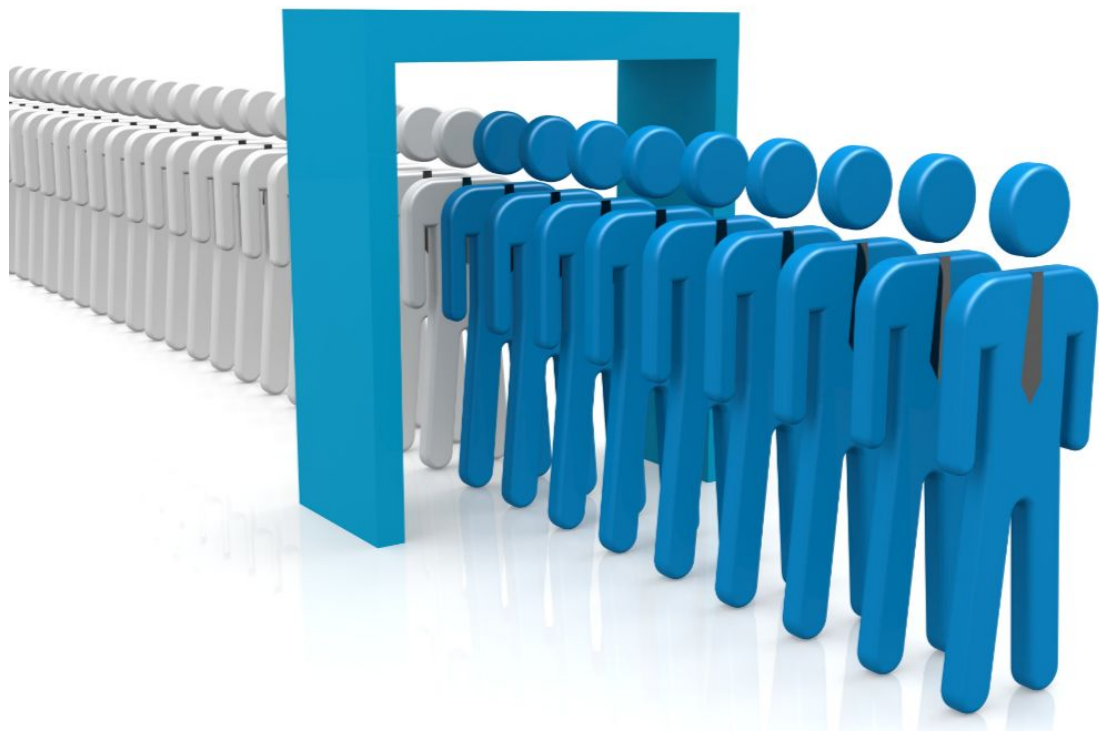
Introducing MVC and Spring MVC

Spring MVC Configuration



To configure Spring MVC support for web applications:

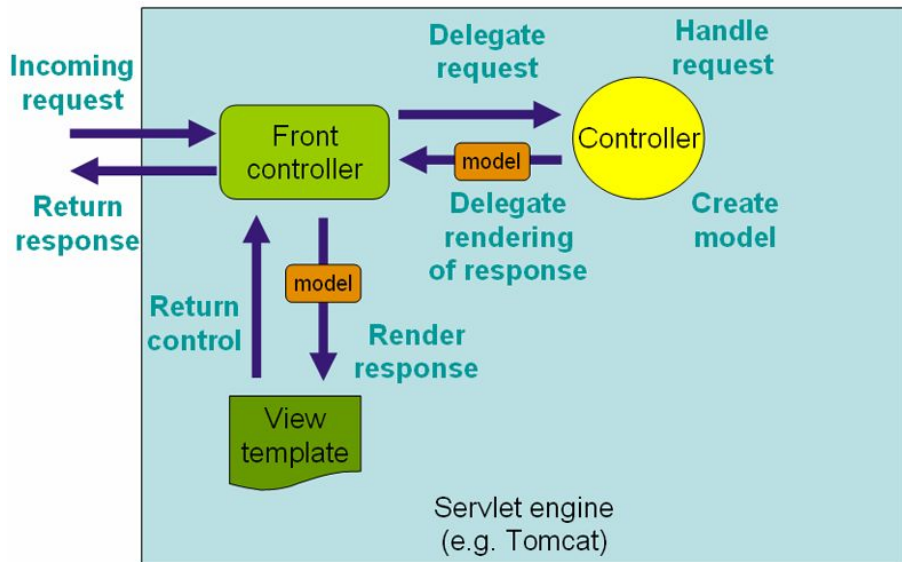
- Configuring the root WebApplicationContext
- Configuring the servlet filters required by Spring MVC
- Configuring the dispatcher servlets within the application



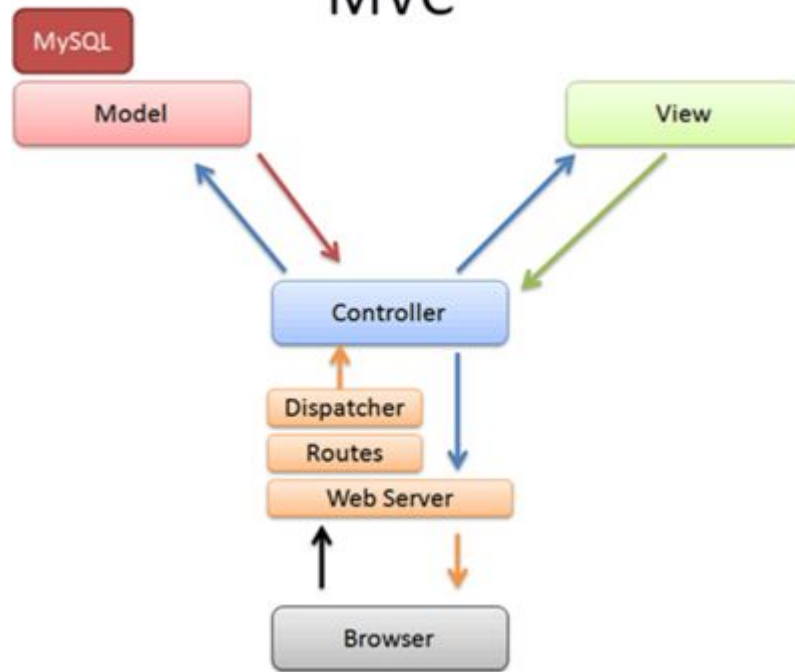
DISPATCHERSERVLET, CONTROLLER, VIEW, MODEL

DispatcherServlet, Controller, View, Model

DispatcherServlet



MVC





```
<?xml version="1.0" encoding="UTF-8"?>  
<web-app version="3.0"  
  xmlns="http://java.sun.com/xml/ns/javaee"  
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"  
  xsi:schemaLocation="http://java.sun.com/xml/ns/javaee  
    http://java.sun.com/xml/ns/javaee/web-app_3_0.xsd">  
  ...  
</web-app>
```



```
<!-- The definition of the Root Spring Container shared by all Servlets
      and Filters -->
<context-param>
  <param-name>contextConfigLocation</param-name>
  <param-value>/WEB-INF/spring/root-servlet.xml</param-value>
</context-param>
```



```
<filter>  
  <filter-name>HttpMethodFilter</filter-name>  
  <filter-class>org.springframework.web.filter.HiddenHttpMethodFilter</filter-class>  
</filter>
```

```
<filter-mapping>  
  <filter-name>HttpMethodFilter</filter-name>  
  <url-pattern>/*</url-pattern>  
</filter-mapping>
```



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

DispatcherServlet, Controller, View, Model

DispatcherServlet Code Overview



```
<!-- Processes application requests -->
<servlet>
  <servlet-name>training</servlet-name>
  <servlet-class>org.springframework.web.servlet.DispatcherServlet</servlet-class>
  <init-param>
    <param-name>contextConfigLocation</param-name>
    <param-value>/WEB-INF/spring/training/training-servlet.xml</param-value>
  </init-param>
  <load-on-startup>1</load-on-startup>
  <multipart-config>
    <max-file-size>5000000</max-file-size>
  </multipart-config>
</servlet>

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



- **Controllers** provide access to the application behavior that you typically define through a service interface.
- **Controllers** interpret user input and transform it into a model that is represented to the user by the view.
- Spring implements a **controller** in a very abstract way, which enables you to create a wide variety of controllers.

```
@RequestMapping("/contacts")
```

```
@Controller
```

```
public class ContactController {
```

```
    private ContactService contactService;
```

```
    @RequestMapping(method = RequestMethod.GET)
```

```
    public String list(Model uiModel) {
```

```
        List<Contact> contacts = contactService.findAll();
```

```
        uiModel.addAttribute("contacts", contacts);
```

```
        return "contacts/list";
```

```
    }
```

```
    @Autowired
```

```
    public void setContactService(ContactService contactService) {
```

```
        this.contactService = contactService;
```

```
    }
```

```
}
```

DispatcherServlet, Controller, View, Model

View Examples



```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<div xmlns:jsp="http://java.sun.com/JSP/Page"
    xmlns:c="http://java.sun.com/jsp/jstl/core"
    xmlns:joda="http://www.joda.org/joda/time/tags"
    version="2.0">
<jsp:directive.page contentType="text/html; charset=UTF-8"/>
<jsp:output omit-xml-declaration="yes"/>

<h1>Contact Listing</h1>

<c:if test="${not empty contacts}">
    <table>
        <thead>
            <tr>
                <th>First Name</th>
                <th>Last Name</th>
                <th>Birth Date</th>
            </tr>
        </thead>
        <tbody>
            <c:forEach items="${contacts}" var="contact">
                <tr>
                    <td>${contact.firstName}</td>
                    <td>${contact.lastName}</td>
                    <td><joda:format value="${contact.birthDate}" pattern="yyyy-MM-dd"/></td>
                </tr>
            </c:forEach>
        </tbody>
    </table>
</c:if>
</div>
```

Model examples

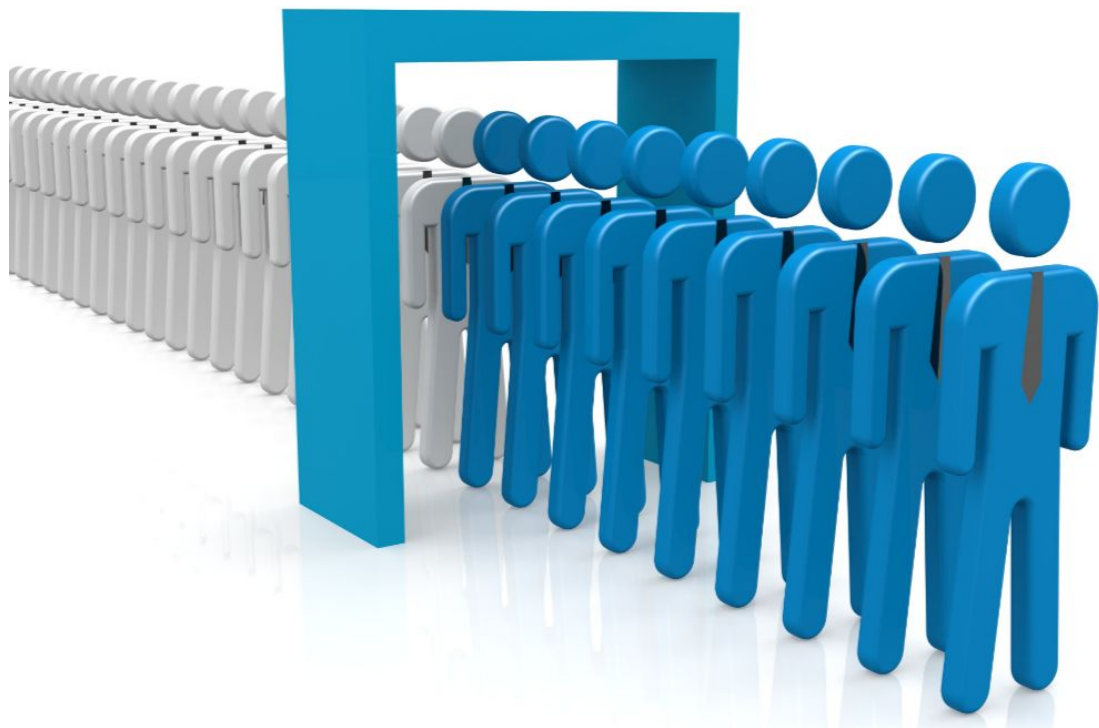


- Map<String, Object>
- Populated by controllers
- Contains all data needed by the „view“
- Not containing business logic

Supported method return types



- ModelAndView
- Model
- Map
- View
- String
- void
-



INTERNATIONALIZATION(I18N) / THEMES /
TEMPLATES (APACHE TILES)



- Enable i18n in the early stage.
- Properties files within the e.g /WEB-INF/i18n folder:
 - ✓ The application*.properties
 - ✓ The message*.properties



```
<beans:bean
    class="org.springframework.web.servlet.i18n.LocaleChangeInterceptor"
    p:paramName="lang" />
</interceptors>
```



```
<beans:bean  
  class="org.springframework.context.support.ReloadableResourceBundleMessageSource"  
  id="messageSource" p:basenames="WEB-INF/i18n/messages,WEB-INF/i18n/application"  
  p:fallbackToSystemLocale="true" />
```

Configuring i18n in DispatcherServlet



```
<beans:bean class="org.springframework.web.servlet.i18n.CookieLocaleResolver"  
    id="localeResolver" p:cookieName="locale" />
```



Example View

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<div xmlns:jsp="http://java.sun.com/JSP/Page"
      xmlns:c="http://java.sun.com/jsp/jstl/core"
      xmlns:joda="http://www.joda.org/joda/time/tags"
      xmlns:spring="http://www.springframework.org/tags"
      version="2.0">
  <jsp:directive.page contentType="text/html;charset=UTF-8"/>
  <jsp:output omit-xml-declaration="yes"/>

  <spring:message code="label_contact_list" var="labelContactList"/>
  <spring:message code="label_contact_first_name" var="labelContactFirstName"/>
  <spring:message code="label_contact_last_name" var="labelContactLastName"/>
  <spring:message code="label_contact_birth_date" var="labelContactBirthDate"/>

  <h1>${labelContactList}</h1>
  <c:if test="${not empty contacts}">
    <table>
      <thead>
        <tr>
          <th>${labelContactFirstName}</th>
          <th>${labelContactLastName}</th>
          <th>${labelContactBirthDate}</th>
        </tr>
      </thead>
      <tbody>
        <c:forEach items="${contacts}" var="contact">
          <tr>
            <td>${contact.firstName}</td>
            <td>${contact.lastName}</td>
            <td><joda:format value="${contact.birthDate}" pattern="yyyy-MM-dd"/></td>
          </tr>
        </c:forEach>
      </tbody>
    </table>
  </c:if>
</div>
```

Internationalization(i18n) / Themes / Templates (Apache Tiles)

Using Themes



```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<%@ taglib uri="http://java.sun.com/jsp/jstl/core" prefix="c"%>
<%@ taglib uri="http://www.springframework.org/tags" prefix="spring"%>
<%@ taglib uri="http://tiles.apache.org/tags-tiles" prefix="tiles"%>
<%@ taglib uri="http://java.sun.com/jsp/jstl/functions" prefix="fn"%>
```

```
<html>
<head>
<meta http-equiv="Content-type" content="text/html; charset=UTF-8" />

<title><spring:message code="welcome_h3" arguments="{app_name}" /></title>
```

```
<spring:theme code="styleSheet" var="app_css" />
<spring:url value="/${app_css}" var="app_css_url" />
<link rel="stylesheet" type="text/css" media="screen"
      href="${app_css_url}" />
```

```
<beans:bean
  class="org.springframework.web.servlet.theme.ThemeChangeInterceptor" />
```

```
<beans:bean
  class="org.springframework.ui.context.support.ResourceBundleThemeSource"
  id="themeSource" />
<beans:bean class="org.springframework.web.servlet.theme.CookieThemeResolver"
  id="themeResolver" p:cookieName="theme" p:defaultThemeName="standard" />
```

Using Themes

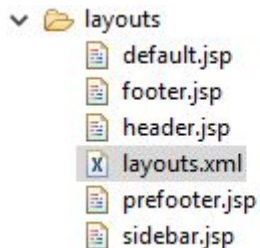


- FixedThemeResolver
- SessionThemeResolver
- CookieThemeResolver

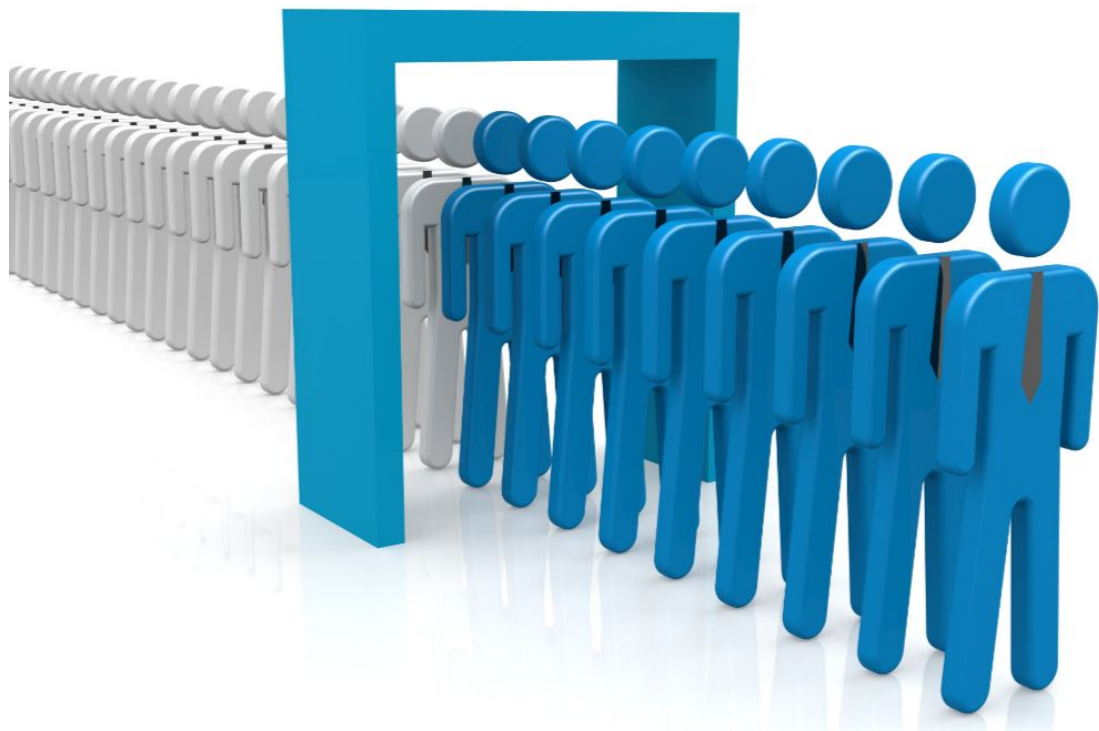


Using templates

Apache

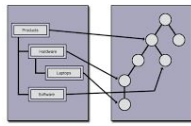


```
1 <?xml version="1.0" encoding="UTF-16"?>
2 <!DOCTYPE tiles-definitions PUBLIC
3     "-//Apache Software Foundation//DTD Tiles Configuration 2.1//EN"
4     "http://tiles.apache.org/dtds/tiles-config_3_0.dtd">
5
6 <tiles-definitions>
7   <definition name="default" template="/WEB-INF/layouts/default.jsp">
8     <put-attribute name="header" value="/WEB-INF/layouts/header.jsp" />
9     <put-attribute name="sidebar" value="/WEB-INF/layouts/sidebar.jsp" />
10    <put-attribute name="prefooter" value="/WEB-INF/layouts/prefooter.jsp" />
11    <put-attribute name="footer" value="/WEB-INF/layouts/footer.jsp" />
12  </definition>
13 </tiles-definitions>
```

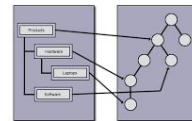


MAPPING OF URLS, VALIDATION SUPPORT

Mapping of URLs to the views



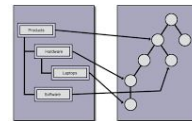
@RequestMapping



@RequestMapping

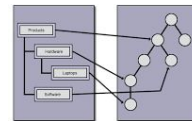
✓ consumes

```
consumes="application/json";  
consumes={!application/json};  
"text/plain", "application/*;
```



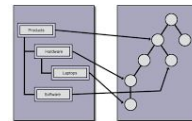
@RequestMapping

- ✓ consumes
 - consumes="application/json";
 - consumes="!application/json";
 - "text/plain", "application/*;
- ✓ headers
 - headers="myHeader=myValue";
 - headers="!myHeader=myValue";
 - headers="myHeader", headers="!myHeader";



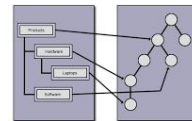
@RequestMapping

- ✓ consumes
 - consumes="application/json";
 - consumes="!application/json";
 - "text/plain", "application/*;
- ✓ headers
 - headers="myHeader=myValue";
 - headers="!myHeader=myValue";
 - headers="myHeader", headers="!myHeader";
- ✓ method
 - RequestMethod.GET, RequestMethod.POST etc.



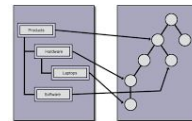
@RequestMapping

- ✓ consumes
 - consumes="application/json";
 - consumes="!application/json";
 - "text/plain", "application/*;
- ✓ headers
 - headers="myHeader=myValue";
 - headers="!myHeader=myValue";
 - headers="myHeader", headers="!myHeader";
- ✓ method
 - RequestMethod.GET, RequestMethod.POST etc.
- ✓ name
- ✓ params
 - params="myParam=myValue";
 - params="!myParam=myValue";



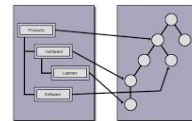
@RequestMapping

- ✓ consumes
 - consumes="application/json";
 - consumes="!application/json";
 - "text/plain", "application/*;
- ✓ headers
 - headers="myHeader=myValue";
 - headers="!myHeader=myValue";
 - headers="myHeader", headers="!myHeader";
- ✓ method
 - RequestMethod.GET, RequestMethod.POST etc.
- ✓ name
- ✓ params
 - params="myParam=myValue";
 - params="!myParam=myValue";
- ✓ path



@RequestMapping

- ✓ consumes
 - consumes="application/json";
 - consumes="!application/json";
 - "text/plain", "application/*;
- ✓ headers
 - headers="myHeader=myValue";
 - headers="!myHeader=myValue";
 - headers="myHeader", headers="!myHeader";
- ✓ method
 - RequestMethod.GET, RequestMethod.POST etc.
- ✓ name
- ✓ params
 - params="myParam=myValue";
 - params="!myParam=myValue";
- ✓ path
- ✓ produces

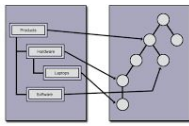


@RequestMapping

- ✓ consumes
 - consumes="application/json";
 - consumes="!application/json";
 - "text/plain", "application/*;
- ✓ headers
 - headers="myHeader=myValue";
 - headers="!myHeader=myValue";
 - headers="myHeader", headers="!myHeader";
- ✓ method
 - RequestMethod.GET, RequestMethod.POST etc.
- ✓ name
- ✓ params
 - params="myParam=myValue";
 - params="!myParam=myValue";
- ✓ path
- ✓ produces
- ✓ value

Mapping of URLs, Validation support (JSR-349)

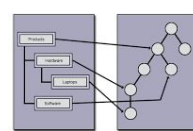
Mapping example



```
@Controller  
@RequestMapping(value = "/registration")  
public class RegistrationPageController {
```

Mapping of URLs, Validation support (JSR-349)

Mapping example

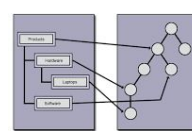


```
@Controller
@RequestMapping(value = "/registration")
public class RegistrationPageController {

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

Mapping of URLs, Validation support (JSR-349)

Mapping example



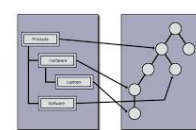
```
@Controller
@RequestMapping(value = "/registration")
public class RegistrationPageController {

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

        @RequestMapping(value =("/{id}", method = RequestMethod.GET)
        public String show(@PathVariable("id") Long id, Model uiModel) {
```

Mapping of URLs, Validation support (JSR-349)

Mapping example



```
@Controller
@RequestMapping(value = "/registration")
public class RegistrationPageController {

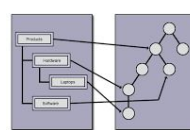
    @RequestMapping(method = RequestMethod.GET)
    public String registration(Model model) {

        @RequestMapping(value =("/{id}", method = RequestMethod.GET)
        public String show(@PathVariable("id") Long id, Model uiModel) {

        @RequestMapping(value =("/{id}", params = "form", method = RequestMethod.GET)
        public String updateForm(@PathVariable("id") Long id, Model uiModel) {
            uiModel.addAttribute("contact", contactService.findById(id));
            return "contacts/update";
        }
    }
}
```

Mapping of URLs, Validation support (JSR-349)

Mapping example



```
@Controller
@RequestMapping(value = "/registration")
public class RegistrationPageController {
```

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

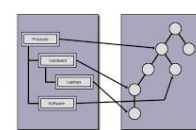
```
        @RequestMapping(value =("/{id}", method = RequestMethod.GET)
        public String show(@PathVariable("id") Long id, Model uiModel) {
```

```
            @RequestMapping(value =("/{id}", params = "form", method = RequestMethod.GET)
            public String updateForm(@PathVariable("id") Long id, Model uiModel) {
                uiModel.addAttribute("contact", contactService.findById(id));
                return "contacts/update";
            }
        }
```

```
            @RequestMapping(value =("/{id}", params = "form", method = RequestMethod.POST)
            public String update(Contact contact, BindingResult bindingResult, Model uiModel,
                HttpServletRequest httpServletRequest, RedirectAttributes redirectAttributes, Locale locale)
            {
                logger.info("Updating contact");
                if (bindingResult.hasErrors()) {
                    uiModel.addAttribute("message", new Message("error", messageSource.getMessage("contact save fail",
                    new Object[]{}, locale)));
                    uiModel.addAttribute("contact", contact);
                    return "contacts/update";
                }
            }
        }
```

Mapping of URLs, Validation support (JSR-349)

Mapping example



```
@Controller
@RequestMapping(value = "/registration")
public class RegistrationPageController {
```

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

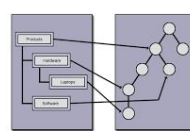
```
@RequestMapping(value =("/{id}", method = RequestMethod.GET)
public String show(@PathVariable("id") Long id, Model uiModel) {
```

```
@RequestMapping(value =("/{id}", params = "form", method = RequestMethod.GET)
public String updateForm(@PathVariable("id") Long id, Model uiModel) {
    uiModel.addAttribute("contact", contactService.findById(id));
    return "contacts/update";
}
```

```
@RequestMapping(value =("/{id}", params = "form", method = RequestMethod.POST)
public String update(Contact contact, BindingResult bindingResult, Model uiModel,
    HttpServletRequest httpServletRequest, RedirectAttributes redirectAttributes, Locale locale)
{
    logger.info("Updating contact");
    if (bindingResult.hasErrors()) {
        uiModel.addAttribute("message", new Message("error", messageSource.getMessage("contact save fail",
new Object[]{}, locale)));
        uiModel.addAttribute("contact", contact);
        return "contacts/update";
    }
}
```

```
@RequestMapping(value = "/view", params="details=all")
```

Mapping example



```
@Controller
@RequestMapping(value = "/registration")
public class RegistrationPageController {
```

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

```
@RequestMapping(value =("/{id}", method = RequestMethod.GET)
public String show(@PathVariable("id") Long id, Model uiModel) {
```

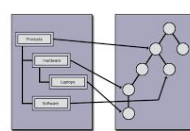
```
@RequestMapping(value =("/{id}", params = "form", method = RequestMethod.GET)
public String updateForm(@PathVariable("id") Long id, Model uiModel) {
    uiModel.addAttribute("contact", contactService.findById(id));
    return "contacts/update";
}
```

```
@RequestMapping(value =("/{id}", params = "form", method = RequestMethod.POST)
public String update(Contact contact, BindingResult bindingResult, Model uiModel,
    HttpServletRequest httpServletRequest, RedirectAttributes redirectAttributes, Locale locale)
{
    logger.info("Updating contact");
    if (bindingResult.hasErrors()) {
        uiModel.addAttribute("message", new Message("error", messageSource.getMessage("contact save fail",
new Object[0], locale)));
        uiModel.addAttribute("contact", contact);
        return "contacts/update";
    }
}
```

```
@RequestMapping(value = "/view", params="details=all")
```

/registration/view?details=all

Mapping example



```
@Controller
@RequestMapping(value = "/registration")
public class RegistrationPageController {
```

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

```
@RequestMapping(value =("/{id}", method = RequestMethod.GET)
public String show(@PathVariable("id") Long id, Model uiModel) {
```

```
@RequestMapping(value =("/{id}", params = "form", method = RequestMethod.GET)
public String updateForm(@PathVariable("id") Long id, Model uiModel) {
    uiModel.addAttribute("contact", contactService.findById(id));
    return "contacts/update";
}
```

```
@RequestMapping(value =("/{id}", params = "form", method = RequestMethod.POST)
public String update(Contact contact, BindingResult bindingResult, Model uiModel,
    HttpServletRequest httpServletRequest, RedirectAttributes redirectAttributes, Locale locale)
{
    logger.info("Updating contact");
    if (bindingResult.hasErrors()) {
        uiModel.addAttribute("message", new Message("error", messageSource.getMessage("contact save fail",
new Object[]{}, locale)));
        uiModel.addAttribute("contact", contact);
        return "contacts/update";
    }
}
```

```
@RequestMapping(value = "/view", params="details=all")
```

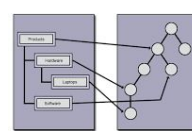
/registration/view?details=all

```
@RequestMapping("/{projectId}")
```

/registration/viewProject/10

Mapping of URLs, Validation support (JSR-349)

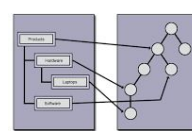
Mapping example



```
@RequestMapping(path="/owners/{ownerId}", method=RequestMethod.GET)  
public String findOwner(@PathVariable String ownerId, Model model) {  
    Owner owner = ownerService.findOwner(ownerId);  
    model.addAttribute("owner", owner);  
    return "displayOwner";  
}
```

Mapping of URLs, Validation support (JSR-349)

Mapping example



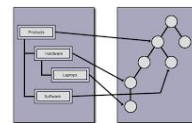
```
@RequestMapping(path="/owners/{ownerId}", method=RequestMethod.GET)
public String findOwner(@PathVariable String ownerId, Model model) {
    Owner owner = ownerService.findOwner(ownerId);
    model.addAttribute("owner", owner);
    return "displayOwner";
}
```

```
@RequestMapping("/spring-web/{symbolicName:[a-z-]+}-{version:\\d\\.\\d\\.\\d}{extension:\\.[a-z]+}")
public void handle(@PathVariable String version, @PathVariable String extension) {
    // ...
}
}
```

/spring-web/spring-web-3.0.5.jar

Spring MVC Annotations

Composed `@RequestMapping` Variants



- `@GetMapping`
- `@PostMapping`
- `@PutMapping`
- `@DeleteMapping`
- `@PatchMapping`

```
@RequestMapping(method = RequestMethod.GET)
public Map<String, Appointment> get() {
    return ...;
}
```



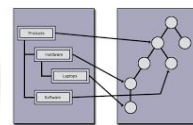
```
@GetMapping
public Map<String, Appointment> get() {
    return ...;
}
```

```
@RequestMapping(method = RequestMethod.POST)
public String add(@Valid AppointmentForm
    appointment, BindingResult result) {
    return ...;
}
```



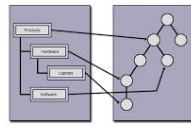
```
@PostMapping
public String add(@Valid AppointmentForm
    appointment, BindingResult result) {
    return ...;
}
```

Path Patterns



/myPath/*.do

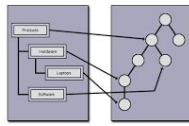
Path Patterns



`/myPath/*.do`

`/owners/*/pets/{petId}`

Path Patterns



/myPath/*.do

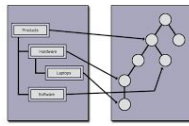
/owners/*/pets/{petId}

/hotels/{hotel}/*



/hotels/{hotel}/**

Path Patterns



/myPath/*.do

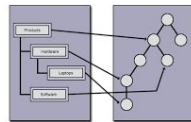
/owners/*/pets/{petId}

/hotels/{hotel}/*



/hotels/{hotel}/**

Path Patterns



/myPath/*.do

/owners/*/pets/{petId}

/hotels/{hotel}/*



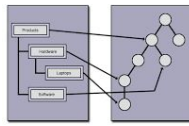
/hotels/{hotel}/**

/foo/bar*



/foo/*

Path Patterns



/myPath/*.do

/owners/*/pets/{petId}

/hotels/{hotel}/*

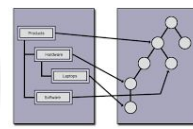


/hotels/{hotel}/**

/foo/bar*



/foo/*



/myPath/*.do

/owners/*/pets/{petId}

/hotels/{hotel}/*



/hotels/{hotel}/**

/foo/bar*

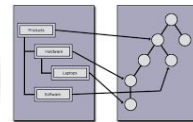


/foo/*

/hotels/*



/hotels/{hotel}



/myPath/*.do

/owners/*/pets/{petId}

/hotels/{hotel}/*



/hotels/{hotel}/**

/foo/bar*

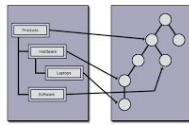


/foo/*

/hotels/*



/hotels/{hotel}



/myPath/*.do

/owners/*/pets/{petId}

/hotels/{hotel}/*



/hotels/{hotel}/**

/foo/bar*



/foo/*

/hotels/*

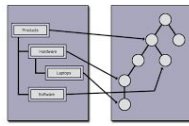


/hotels/{hotel}

/**



/api/{a}/{b}/{c}



/myPath/*.do

/owners/*/pets/{petId}

/hotels/{hotel}/*



/hotels/{hotel}/**

/foo/bar*



/foo/*

/hotels/*

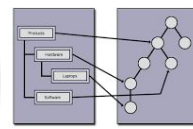


/hotels/{hotel}

/**



/api/{a}/{b}/{c}



/myPath/*.do

/owners/*/pets/{petId}

/hotels/{hotel}/*



/hotels/{hotel}/**

/foo/bar*



/foo/*

/hotels/*



/hotels/{hotel}

/**

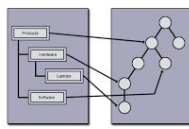


/api/{a}/{b}/{c}

/public/**



/public/path3/{a}/{b}/{c}



/myPath/*.do

/owners/*/pets/{petId}

/hotels/{hotel}/*



/hotels/{hotel}/**

/foo/bar*



/foo/*

/hotels/*



/hotels/{hotel}

/**



/api/{a}/{b}/{c}

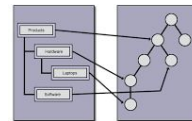
/public/**



/public/path3/{a}/{b}/{c}

Spring MVC Annotations

@RequestBody

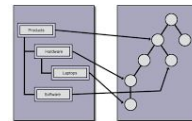


- @PathVariable
- @RequestParam
- @RequestHeader
- @RequestBody

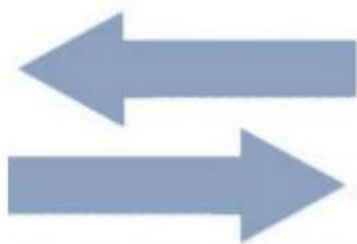
```
@PutMapping("/something")  
public void handle(@RequestBody String body, Writer writer) throws IOException {  
    writer.write(body);  
}
```


Spring MVC Annotations

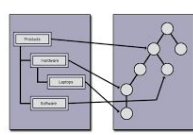
@ResponseBody



```
@GetMapping("/something")
@ResponseBody
public String helloWorld() {
    return "Hello World";
}
```



HttpMessageConverter

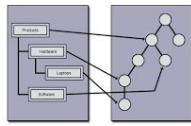


@RestController



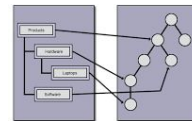
Spring MVC Annotations

@ModelAttribute on a method



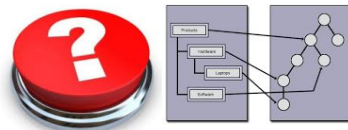
```
// Add one attribute
// The return value of the method is added to the model under the name "account"
// You can customize the name via @ModelAttribute("myAccount")
@ModelAttribute
public Account addAccount(@RequestParam String number) {
    return accountManager.findAccount(number);
}

// Add multiple attributes
@ModelAttribute
public void populateModel(@RequestParam String number, Model model) {
    model.addAttribute(accountManager.findAccount(number));
    // add more ...
}
```



```
@PostMapping("/owners/{ownerId}/pets/{petId}/edit")  
public String processSubmit(@ModelAttribute Pet pet) { }
```

Content Negotiation



```
@Configuration
@EnableWebMvc
public class WebConfig extends WebMvcConfigurerAdapter {

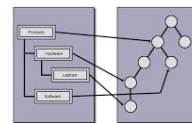
    @Override
    public void configureContentNegotiation(ContentNegotiationConfigurer configurer) {
        configurer.mediaType("json", MediaType.APPLICATION_JSON);
    }
}
```

```
<mvc:annotation-driven content-negotiation-manager="contentNegotiationManager"/>

<bean id="contentNegotiationManager" class="org.springframework.web.accept.ContentNegotiationManagerFactoryBean">
    <property name="mediaTypes">
        <value>
            json=application/json
            xml=application/xml
        </value>
    </property>
</bean>
```

Mapping of URLs, Validation support (JSR-349)

Configure JSR-349, “Bean Validation”



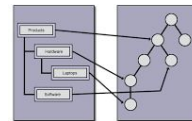
```
@Entity
@Table(name = "contact")
public class Contact implements Serializable {
    private Long id;
    private String firstName;
    private String lastName;

    @Id
    @GeneratedValue(strategy = IDENTITY)
    @Column(name = "ID")
    public Long getId() {
        return id;
    }
    public void setId(Long id) {
        this.id = id;
    }
    @NotEmpty(message="{validation.firstname.NotEmpty.message}")
    @Size(min=3, max=60, message="{validation.firstname.Size.message}")
    @Column(name = "FIRST_NAME")
    public String getFirstName() {
        return firstName;
    }
    public void setFirstName(String firstName) {
        this.firstName = firstName;
    }
    @NotEmpty(message="{validation.lastname.NotEmpty.message}")
    @Size(min=1, max=40, message="{validation.lastname.Size.message}")
    @Column(name = "LAST_NAME")
    public String getLastName() {
        return lastName;
    }
    public void setLastName(String lastName) {
        this.lastName = lastName;
    }
}
```



Mapping of URLs, Validation support (JSR-349)

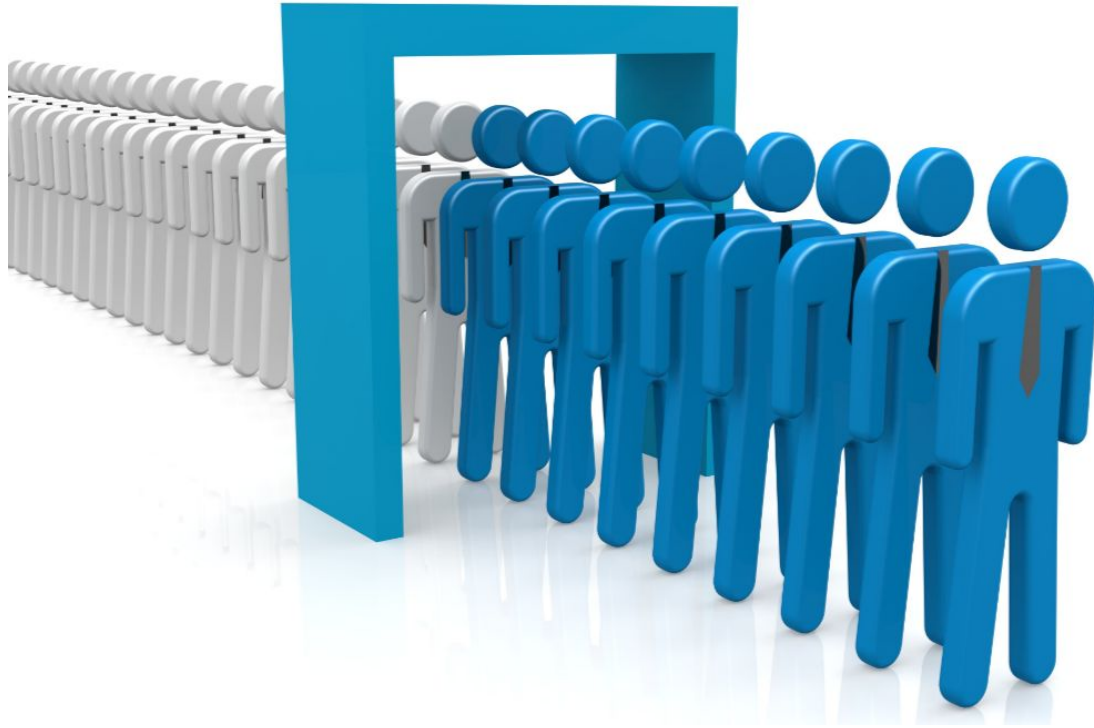
Configure JSR-349, “Bean Validation”



```
public String update(@Valid Contact contact, ...  
public String create(@Valid Contact contact, ...
```



```
<annotation-driven validator="validator"/>  
<beans:bean id="validator" class="org.springframework.validation.beanvalidation.LocalValidatorFactoryBean">  
  <beans:property name="validationMessageSource" ref="messageSource"/>  
</beans:bean>
```



FILE UPLOAD HANDLING

File Upload Handling Overview



Apache Commons FileUpload



Tomcat 7 -> Servlet 3.0 -> Spring 3.1

File Upload Handling

Enable File Upload support



```
<?xml version="1.0" encoding="UTF-8"?>
<web-app version="3.0" xmlns=http://java.sun.com/xml/ns/javaee
  <!-- Processes application requests -->
  <servlet>
    <servlet-name>training</servlet-name>
    <servlet-class>org.springframework.web.servlet.DispatcherServlet</servlet-class>
    <init-param>
      <param-name>contextConfigLocation</param-name>
      <param-value>/WEB-INF/spring/training/training-servlet.xml</param-value>
    </init-param>
    <load-on-startup>1</load-on-startup>
    <multipart-config>
      <max-file-size>5000000</max-file-size>
    </multipart-config>
  </servlet>
</web-app>
```

File Upload Handling

Enable File Upload support



```
<?xml version="1.0" encoding="UTF-8"?>
<web-app version="3.0" xmlns=http://java.sun.com/xml/ns/javaee
  <!-- Processes application requests -->
  <servlet>
    <servlet-name>training</servlet-name>
    <servlet-class>org.springframework.web.servlet.DispatcherServlet</servlet-class>
    <init-param>
      <param-name>contextConfigLocation</param-name>
      <param-value>/WEB-INF/spring/training/training-servlet.xml</param-value>
    </init-param>
    <load-on-startup>1</load-on-startup>
    <multipart-config>
      <max-file-size>5000000</max-file-size>
    </multipart-config>
  </servlet>
</web-app>

<beans:bean
  class="org.springframework.web.multipart.support.StandardServletMultipartResolver"
  id="multipartResolver" >
</beans:bean>
```

File Upload Handling

Modifying Views for File Upload Support



```
<div id="contactInfo">  
  <form:form modelAttribute="customer" id="customer" method="POST" enctype="multipart/form-data">  
  
  <td></img></td>
```

File Upload Handling

Modifying Views for File Upload Support



```
<div id="contactInfo">
  <form:form modelAttribute="customer" id="customer" method="POST" enctype="multipart/form-data">
    <td></img></td>
```

```
private void processUploadFile(@ModelAttribute("customer") Customer customer,
    @RequestParam(value = "file", required = false) Part file) {
    if (file != null) {
        logger.info("File name: " + file.getName());
        logger.info("File size: " + file.getSize());
        logger.info("File content type: " + file.getContentType());
        byte[] fileContent = null;
        try {
            InputStream inputStream = file.getInputStream();
            if (inputStream == null)
                logger.info("File inputStream is null");
            fileContent = IOUtils.toByteArray(inputStream);
            customer.setPhoto(fileContent);
        } catch (IOException ex) {
            logger.error("Error saving uploaded file");
        }
        customer.setPhoto(fileContent);
    }
}
```

File Upload Handling

Modifying Views for File Upload Support



```
<div id="contactInfo">
  <form:form modelAttribute="customer" id="customer" method="POST" enctype="multipart/form-data">
    <td></img></td>
```

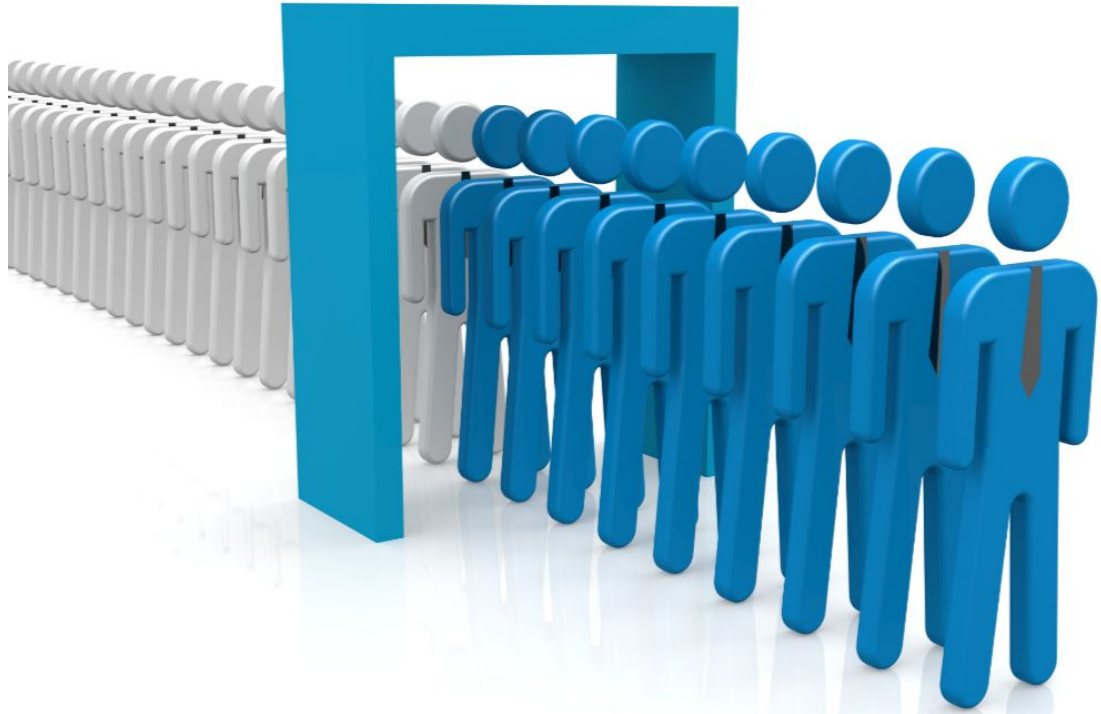
```
private void processUploadFile(@ModelAttribute("customer") Customer customer,
    @RequestParam(value = "file", required = false) Part file) {
    if (file != null) {
        logger.info("File name: " + file.getName());
        logger.info("File size: " + file.getSize());
        logger.info("File content type: " + file.getContentType());
        byte[] fileContent = null;
        try {
            InputStream inputStream = file.getInputStream();
            if (inputStream == null)
                logger.info("File inputstream is null");
            fileContent = IOUtils.toByteArray(inputStream);
            customer.setPhoto(fileContent);
        } catch (IOException ex) {
            logger.error("Error saving uploaded file");
        }
        customer.setPhoto(fileContent);
    }
}
```

```
25 <spring:message code="label_contact_photo" var="labelContactPhoto" />
26 <spring:url value="/customerpanel/photo" var="contactPhotoUrl" />
27 <spring:url value="/customerpanel" var="editContactUrl" />
28 <spring:url value="/customerpanel/delete" var="deleteContactUrl" />
29 <spring:message code="label_contact_photo" var="labelContactPhoto" />
30 </head>
```

```
@RequestMapping(value = "/photo/{id}", method = RequestMethod.GET)
@ResponseBody
public byte[] downloadPhoto(@PathVariable("id") Long id) {
    Customer customer = customerService.findOne(id);

    if (customer.getPhoto() != null) {
        logger.info("Downloading photo for id: {} with size: {}", cust
    }

    return customer.getPhoto();
}
```



SUPPORTING SERVLET 3.0 CODE-BASED (JAVA-BASED)
CONFIGURATION



Advantages?





Advantages?

- Java синтаксис
- Code IDE advantages
- Flexibility
- No need in full build and redeploy





Advantages?

- Java синтаксис
- Code IDE advantages
- Flexibility
- No need in full build and redeploy

`org.springframework.web.WebApplicationInitializer`

`org.springframework.web.SpringServletContainerInitializer`



Supporting Servlet 3.0 Code-Based (Java-Based) Configuration

Configuration



```
public class MyWebAppInitializer implements
WebApplicationInitializer {
    @Override
    public void onStartup(ServletContext container) throws
ServletException {
        XmlWebApplicationContext appContext = new
XmlWebApplicationContext();

appContext.setConfigLocation("/WEB-INF/spring/appServlet/s
ervlet-context.xml");
        ServletRegistration.Dynamic dispatcher =
container.addServlet("appServlet", new
DispatcherServlet(appContext));
        MultipartConfigElement multipartConfigElement =
new MultipartConfigElement(null, 5000000, 5000000, 0);
dispatcher.setMultipartConfig(multipartConfigElement);
dispatcher.setLoadOnStartup(1);
dispatcher.addMapping("/");
    }
}
```



Supporting Servlet 3.0 Code-Based (Java-Based) Configuration

Configuration



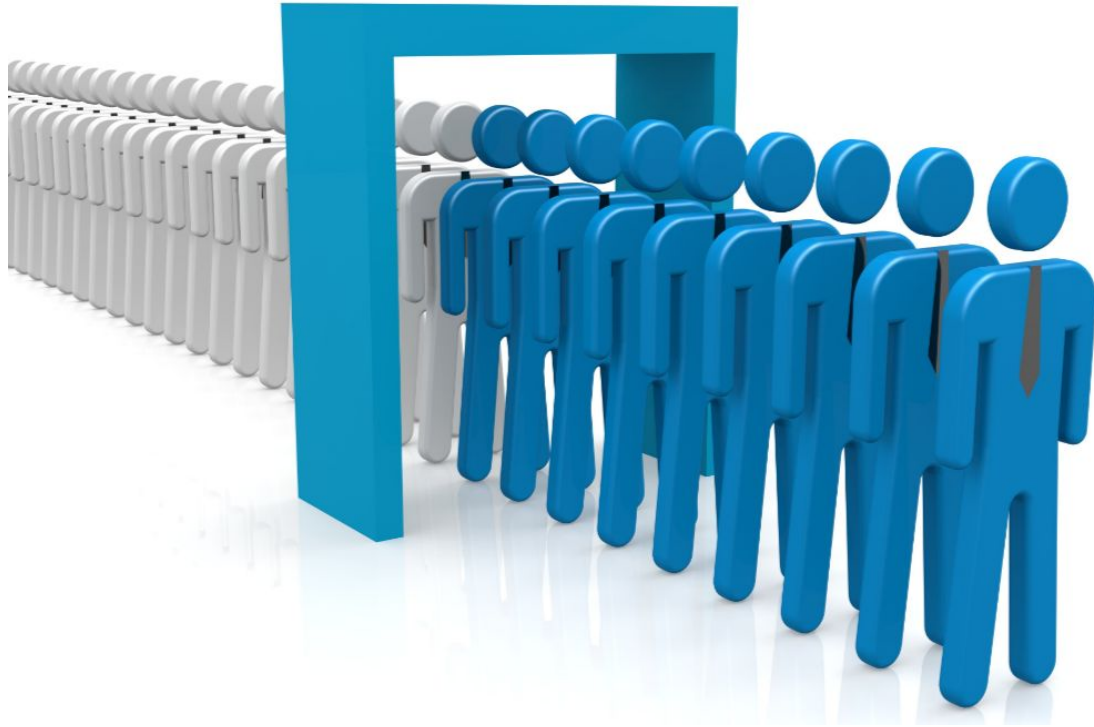
```
public class MyWebAppInitializer implements
WebApplicationInitializer {
    @Override
    public void onStartup(ServletContext container) throws
ServletException {
        XmlWebApplicationContext appContext = new
XmlWebApplicationContext();

appContext.setConfigLocation("/WEB-INF/spring/appServlet/s
ervlet-context.xml");
        ServletRegistration.Dynamic dispatcher =
container.addServlet("appServlet", new
DispatcherServlet(appContext));
        MultipartConfigElement multipartConfigElement =
new MultipartConfigElement(null, 5000000, 5000000, 0);
dispatcher.setMultipartConfig(multipartConfigElement);
dispatcher.setLoadOnStartup(1);
dispatcher.addMapping("/");
    }
}
```

```
<ervlet>
    <ervlet-name>appServlet</ervlet-name>

<ervlet-class>org.springframework.web.servlet.DispatcherSer
vlet</ervlet-class>
    <init-param>
        <param-name>contextConfigLocation</param-name>

<param-value>/WEB-INF/spring/appServlet/servlet-context.xml
</param-value>
    </init-param>
    <load-on-startup>1</load-on-startup>
    <multipart-config>
        <max-file-size>5000000</max-file-size>
    </multipart-config>
</ervlet>
<ervlet-mapping>
    <ervlet-name>appServlet</ervlet-name>
    <url-pattern>/</url-pattern>
</ervlet-mapping>
```



HANDLING EXCEPTIONS

Handling exceptions

Dealing with exceptions



- ❑ Exceptions -> Status Codes
- ❑ `org.springframework.web.servlet.HandlerExceptionHandler`: Exception -> ModelAndView
- ❑ `SimpleMappingExceptionHandler`: Exceptions -> Views
- ❑ `@ExceptionHandler`, `@ControllerAdvice`
- ❑ `@ResponseStatus`





```
@Controller
public class SimpleController {

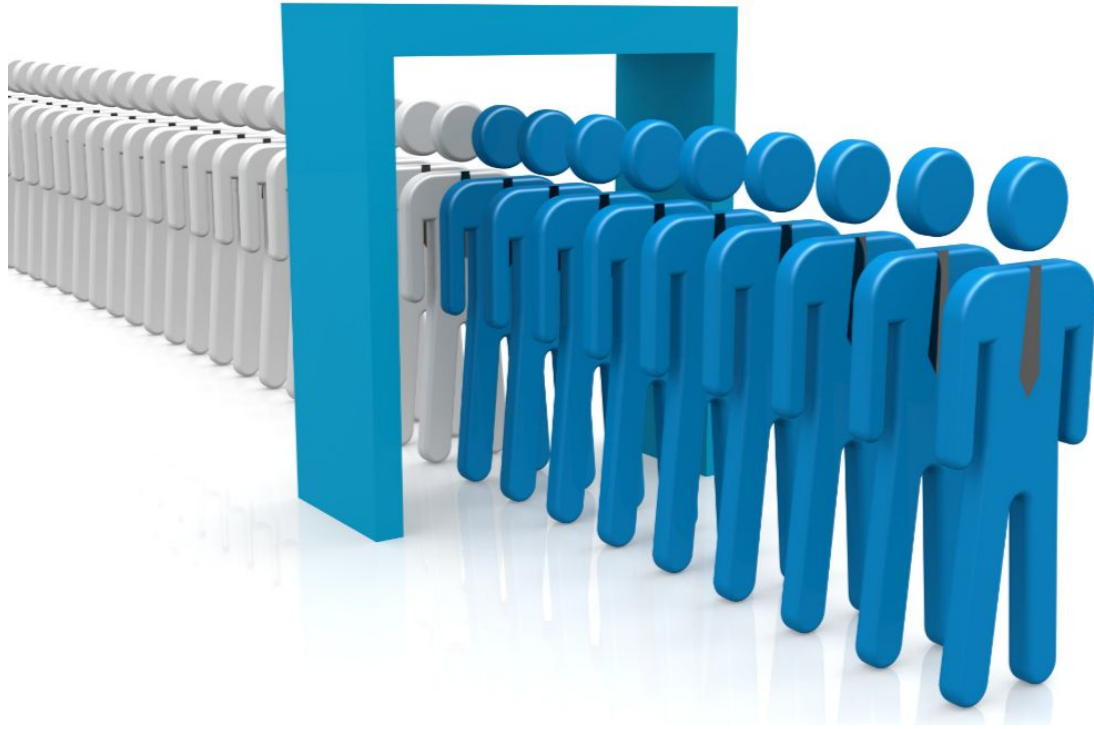
    // @RequestMapping methods omitted ...

    @ExceptionHandler(IOException.class)
    public ResponseEntity<String> handleIOException(IOException ex) {
        // prepare responseEntity
        return responseEntity;
    }
}
```



```
@ResponseStatus(HttpStatus.INTERNAL_SERVER_ERROR)
@ExceptionHandler(DataAccessException.class)
public void handleDataAccessError(DataAccessException ex) {}

@ResponseStatus(value = HttpStatus.PAYMENT_REQUIRED, message = "I need money.")
public class PaymentRequiredException {}
```



SPRING MVC AND SPRING SECURITY



- Declaration Security
- Support for many authentication and authorization schemes, such as basic, form-based, based on digests, JDBC and LDAP.
- Support for security at the level of methods and security annotations JSR-250
- Support for a one-time password
- Container integration support
- Supports anonymous sessions, simultaneous sessions, "remember me" mode, channel-level security and much more



Spring MVC and Spring Security Libraries



Maven Dependencies for Spring Security

Group ID	Artifact ID	Version	Description
org.springframework.security	spring-security-core	3.2.1.RELEASE	Spring Security core module
org.springframework.security	spring-security-web	3.2.1.RELEASE	Spring Security web module
org.springframework.security	spring-security-config	3.2.1.RELEASE	Spring Security configuration module
org.springframework.security	spring-security-taglibs	3.2.1.RELEASE	Spring Security JSP tag library



Configure a filter in the web deployment descriptor:

```
<!-- Spring Security Configuration -->
<filter>
  <filter-name>springSecurityFilterChain</filter-name>
  <filter-class>org.springframework.web.filter.DelegatingFilterProxy</filter-class>
</filter>
<filter-mapping>
  <filter-name>springSecurityFilterChain</filter-name>
  <url-pattern>/*</url-pattern>
</filter-mapping>
<!-- Filters ... -->
```

Spring MVC and Spring Security

Configuring Spring Security



```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <beans:beans xmlns="http://www.springframework.org/schema/security"
3             xmlns:beans="http://www.springframework.org/schema/beans"
4             xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5             xsi:schemaLocation="http://www.springframework.org/schema/beans
6                                 http://www.springframework.org/schema/beans/spring-beans.xsd
7                                 http://www.springframework.org/schema/security
8                                 http://www.springframework.org/schema/security/spring-security.xsd">
9
10    <http use-expressions="true">
11        <intercept-url pattern="/WEB-INF" access='permitAll' />
12        <form-login login-page="/contacts" authentication-failure-url="/security/loginfail"
13                    default-target-url="/contacts" />
14        <logout logout-success-url="/contacts"/>
15    </http>
16
17    <authentication-manager>
18        <authentication-provider>
19            <user-service>
20                <user name="user" password="user" authorities="ROLE_USER" />
21            </user-service>
22        </authentication-provider>
23    </authentication-manager>
24 </beans:beans>
25
```

Spring MVC and Spring Security

Adding Login Functions to the Application



```
1 <%@ taglib prefix="spring" uri="http://www.springframework.org/tags"%>
2 <%@ taglib prefix="c" uri="http://java.sun.com/jsp/jstl/core"%>
3 <%@ taglib prefix="form" uri="http://www.springframework.org/tags/form"%>
4 <%@ taglib uri="http://www.springframework.org/security/tags" prefix="sec" %>
5
6 <c:set var="contextPath" value="${pageContext.request.contextPath}" />
7 <!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN" "http://www.w3.org/TR/html4/loose.dtd">
8 <html>
9 <head>
10 <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
11 <title>Login page</title>
12 <spring:message code="label.username" var="username" />
13 <spring:message code="label.password" var="password" />
14 <spring:message code="welcome_titlepane" var="welcome" />
15 <spring:message code="label.notlogin" var="notlogin" />
16 <spring:url var="tocustomerpanel" value="/customerpanel" />
17 <spring:message code="label_customerpanel" var="labelPanel" />
18 </head>
19 <body>
20 <${welcome}>
21 <sec:authorize access="!isAuthenticated()">
22 <a href="<c:url value="/login" />">${notlogin}</a>
23 <p/>
24 </sec:authorize>
25 <sec:authorize access="isAuthenticated()">${labelWelcome}
26 <sec:authentication property="principal.username" />
27 <br/>
28 <a href="<${tocustomerpanel}>">${labelPanel}</a>
29 </sec:authorize>
30 <sec:authorize access="hasAuthority('ROLE_ADMIN')">
31 <div style="text-align: center;>You're acting as Admin!</div>
32 </sec:authorize>
33 </body>
34 </html>
```

Spring MVC and Spring Security

Enable Method-Level Security



```
<!-- Enable controller method level security -->  
<security:global-method-security pre-post-annotations="enabled"/>
```

```
@Configuration  
@EnableWebSecurity  
@EnableGlobalMethodSecurity(securedEnabled = true, prePostEnabled = true)  
public class SecurityConfig extends WebSecurityConfigurerAdapter {
```

Spring MVC and Spring Security

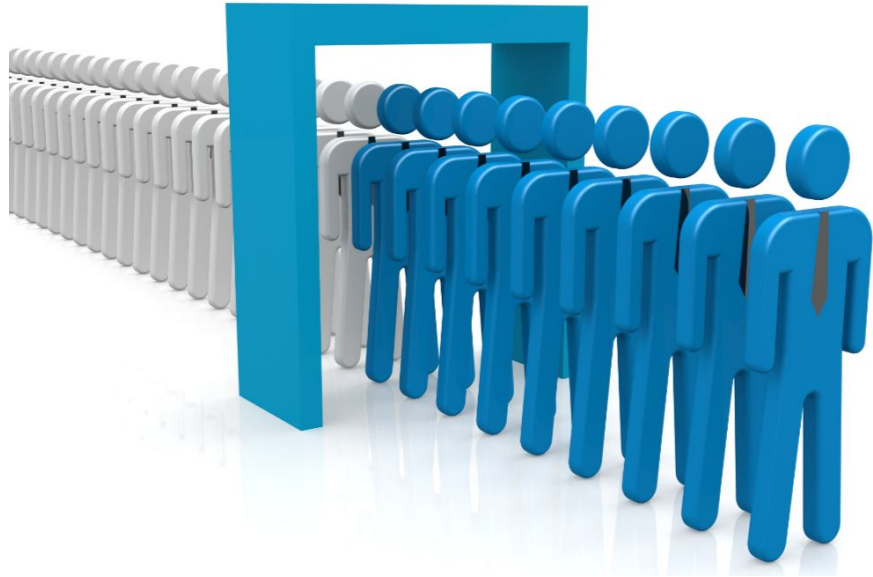
Enable Method-Level Security



```
<!-- Enable controller method level security -->  
<security:global-method-security pre-post-annotations="enabled"/>
```

```
@Configuration  
@EnableWebSecurity  
@EnableGlobalMethodSecurity(securedEnabled = true, prePostEnabled = true)  
public class SecurityConfig extends WebSecurityConfigurerAdapter {
```

```
@PreAuthorize("isAuthenticated()")  
@RequestMapping("/customerpanel")  
@Controller  
public class CustomerController {  
    private final Logger logger = LoggerFactory.getLogger(CustomerController.class);  
  
    @Autowired  
    private CustomerService customerService;  
    @Autowired  
    private MessageSource messageSource;
```



- <http://docs.spring.io/spring/docs/current/spring-framework-reference/htmlsingle>
- <http://en.wikipedia.org/wiki/Model%E2%80%93view%E2%80%93controller>
- http://en.wikipedia.org/wiki/Spring_Framework#Model-view-controller_framework

HELPFUL LINKS



THANK YOU FOR YOUR ATTENTION