Spring MVC Exception Handling – @ControllerAdvice, @ExceptionHandler, HandlerExceptionResolver

APRIL 2, 2018 BY PANKAJ — 27 COMMENTS

Spring MVC Exception Handling is very important to make sure you are not sending server exceptions to client. Today we will look into Spring Exception Handling using @ExceptionHandler, @ControllerAdvice and HandlerExceptionResolver. Any web application requires good design for exception handling because we don't want to serve container generated page when any unhandled exception is thrown by our application.

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Spring Exception Handling

Having a well defined exception handling approach is a huge plus point for any web application framework, that being said Spring MVC framework delivers well when it comes to exception and error handling in our web applications.

Spring MVC Framework provides following ways to help us achieving robust exception handling.

1. **Controller Based** – We can define exception handler methods in our controller classes. All we need is to annotate these methods with `@ExceptionHandler` annotation. This annotation takes Exception class as argument. So if we have defined one of these for Exception class, then all the exceptions thrown by our request handler method will have handled.
   These exception handler methods are just like other request handler methods and we can build error response and respond with different error page. We can also send JSON error response, that we will look later on in our example.

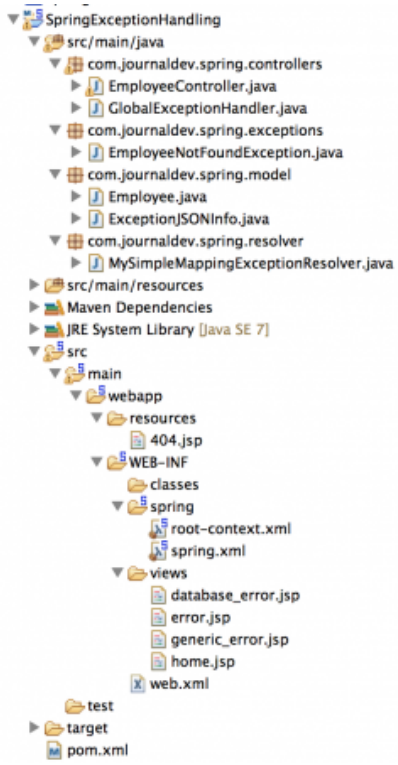
   If there are multiple exception handler methods defined, then handler method that is closest to the Exception class is used. For example, if we have two handler methods defined for IOException and Exception and our request handler method throws IOException, then handler method for IOException will get executed.

2. **Global Exception Handler** – Exception Handling is a cross-cutting concern, it should be done for all the pointcuts in our application. We have already looked into Spring AOP and that's why Spring provides `@ControllerAdvice` annotation that we can use with any class to define our global exception handler.
   The handler methods in Global Controller Advice is same as Controller based exception handler methods and used when controller class is not able to handle the exception.

3. **HandlerExceptionResolver** – For generic exceptions, most of the times we serve static pages. Spring Framework provides `HandlerExceptionResolver` interface that we can implement to create global exception handler. The reason behind this additional way to define global exception handler is that Spring framework also provides default implementation classes that we can define in our spring bean configuration file to get spring framework exception handling benefits.
   `SimpleMappingExceptionResolver` is the default implementation class, it allows us to configure exceptionMappings where we can specify which resource to use for a particular exception. We can also override it to create our own global handler with our application specific changes, such as logging of exception messages.

Let's create a Spring MVC project where we will look into the implementation of Controller based, AOP Based and Exception Resolver Based exception and error handling approaches. We will also write a exception handler method that will return JSON response. If you are new to JSON in Spring, read Spring Restful JSON Tutorial.

Our final project will look like below image, we will look at all the components of our application one by one.



Spring Exception Handling Maven Dependencies

Apart from standard Spring MVC dependencies, we would also need Jackson JSON dependency for JSON support.

Our final pom.xml file looks like below.

```
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
	xsi:schemaLocation="http://maven.apache.org/POM/4.0.0
http://maven.apache.org/maven-v4_0_0.xsd">
	<modelVersion>4.0.0</modelVersion>
	<groupId>com.journaldev.spring</groupId>
	<artifactId>SpringExceptionHandling</artifactId>
	<name>SpringExceptionHandling</name>
	<packaging>war</packaging>
	<version>1.0.0-BUILD-SNAPSHOT</version>
	<properties>
		<java-version>1.6</java-version>
		<org.springframework-version>4.0.2.RELEASE</org.springframework-
version>
		<org.aspectj-version>1.7.4</org.aspectj-version>
```

```
		<org.slf4j-version>1.7.5</org.slf4j-version>
		<jackson.databind-version>2.2.3</jackson.databind-version>
	</properties>
	<dependencies>
		<!-- Jackson -->
```

I have updated Spring Framework, AspectJ, Jackson and slf4j versions to use the latest one.

Spring MVC Exception Handling Deployment Descriptor

Our web.xml file looks like below.

```
<?xml version="1.0" encoding="UTF-8"?>
<web-app version="2.5" 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_2_5.xsd">

	<!-- 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-context.xml</param-value>
	</context-param>

	<!-- Creates the Spring Container shared by all Servlets and Filters -->
	<listener>
		<listener-
class>org.springframework.web.context.ContextLoaderListener</listener-class>
	</listener>

	<!-- Processes application requests -->
	<servlet>
		<servlet-name>appServlet</servlet-name>
```

Most of the part is for plugging in Spring Framework for our web application, except the error-page defined for 404 error. So when our application will throw 404 error, this page will be used as response. This configuration is used by container when our spring web application throws 404 error code.

Spring Exception Handling – Model Classes

I have defined Employee bean as model class, however we will be using it in our application just to return valid response in specific scenario. We will be deliberately throwing different types of exceptions in most of the cases.

```
package com.journaldev.spring.model;

public class Employee {

	private String name;
	private int id;

	public String getName() {
		return name;
	}

	public void setName(String name) {
		this.name = name;
	}

	public int getId() {
		return id;
	}

	public void setId(int id) {
		this.id = id;
	}
```

Since we will be returning JSON response too, let's create a java bean with exception details that will be sent as response.

```
package com.journaldev.spring.model;

public class ExceptionJSONInfo {

	private String url;
	private String message;

	public String getUrl() {
		return url;
	}
	public void setUrl(String url) {
		this.url = url;
	}
```

```
        public String getMessage() {
                return message;
        }
        public void setMessage(String message) {
                this.message = message;
        }
}
```

Spring Exception Handling – Custom Exception Class

Let's create a custom exception class to be used by our application.

```
package com.journaldev.spring.exceptions;

import org.springframework.http.HttpStatus;
import org.springframework.web.bind.annotation.ResponseStatus;

@ResponseStatus(value=HttpStatus.NOT_FOUND, reason="Employee Not Found") //404
public class EmployeeNotFoundException extends Exception {

        private static final long serialVersionUID = -3332292346834265371L;

        public EmployeeNotFoundException(int id){
                super("EmployeeNotFoundException with id="+id);
        }
}
```

Notice that we can use `@ResponseStatus` annotation with exception classes to define the HTTP code that will be sent by our application when this type of exception is thrown by our application and handled by our exception handling implementations.

As you can see that I am setting HTTP status as 404 and we have an error-page defined for this, so our application should use the error page for this type of exception if we are not returning any view.

We can also override the status code in our exception handler method, think of it as default http status code when our exception handler method is not returning any view page as response.

Spring MVC Exception Handling Controller Class Exception Handler

Let's look at our controller class where we will throw different type of exceptions.

```
package com.journaldev.spring.controllers;
```

```
import java.io.IOException;
import java.sql.SQLException;

import javax.servlet.http.HttpServletRequest;

import org.slf4j.Logger;
import org.slf4j.LoggerFactory;
import org.springframework.stereotype.Controller;
import org.springframework.ui.Model;
import org.springframework.web.bind.annotation.ExceptionHandler;
import org.springframework.web.bind.annotation.PathVariable;
import org.springframework.web.bind.annotation.RequestMapping;
import org.springframework.web.bind.annotation.RequestMethod;
import org.springframework.web.bind.annotation.ResponseBody;
import org.springframework.web.servlet.ModelAndView;

import com.journaldev.spring.exceptions.EmployeeNotFoundException;
import com.journaldev.spring.model.Employee;
import com.journaldev.spring.model.ExceptionJSONInfo;
```

Notice that for EmployeeNotFoundException handler, I am returning ModelAndView and hence http status code will be sent as OK (200). If it would have been returning void, then http status code would have been sent as 404. We will look into this type of implementation in our global exception handler implementation.

Since I am handling only EmployeeNotFoundException in controller, all other exceptions thrown by our controller will be handled by global exception handler.

@ControllerAdvice and @ExceptionHandler

Here is our global exception handler controller class. Notice the class is annotated with @ControllerAdvice annotation. Also methods are annotated with @ExceptionHandler annotation.

```
package com.journaldev.spring.controllers;

import java.io.IOException;
import java.sql.SQLException;

import javax.servlet.http.HttpServletRequest;

import org.slf4j.Logger;
import org.slf4j.LoggerFactory;
import org.springframework.http.HttpStatus;
import org.springframework.web.bind.annotation.ControllerAdvice;
```

```
import org.springframework.web.bind.annotation.ExceptionHandler;
import org.springframework.web.bind.annotation.ResponseStatus;

@ControllerAdvice
public class GlobalExceptionHandler {

        private static final Logger logger =
LoggerFactory.getLogger(GlobalExceptionHandler.class);

        @ExceptionHandler(SQLException.class)
        public String handleSQLException(HttpServletRequest request, Exception ex){
```

Notice that for SQLException, I am returning database_error.jsp as response page with http status code as 200.

For IOException, we are returning void with status code as 404, so our error-page will be used in this case.

As you can see that I am not handling any other types of exception here, that part I have left for HandlerExceptionResolver implementation.

HandlerExceptionResolver

We are just extending SimpleMappingExceptionResolver and overriding one of the method, but we can override it's most important method `resolveException` for logging and sending different types of view pages. But that is same as using ControllerAdvice implementation, so I am leaving it. We will be using it to configure view page for all the other exceptions not handled by us by responding with generic error page.

Spring Exception Handling Configuration File

Our spring bean configuration file looks like below.

spring.xml code:

```
<?xml version="1.0" encoding="UTF-8"?>
<beans:beans xmlns="http://www.springframework.org/schema/mvc"
        xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
        xmlns:beans="http://www.springframework.org/schema/beans"
        xmlns:context="http://www.springframework.org/schema/context"
        xsi:schemaLocation="http://www.springframework.org/schema/mvc
http://www.springframework.org/schema/mvc/spring-mvc.xsd
                http://www.springframework.org/schema/beans
http://www.springframework.org/schema/beans/spring-beans.xsd
                http://www.springframework.org/schema/context
http://www.springframework.org/schema/context/spring-context.xsd">
```

```
        <!-- DispatcherServlet Context: defines this servlet's request-processing
infrastructure -->

        <!-- Enables the Spring MVC @Controller programming model -->
        <annotation-driven />

        <!-- Handles HTTP GET requests for /resources/** by efficiently serving up
static resources in the ${webappRoot}/resources directory -->
        <resources mapping="/resources/**" location="/resources/" />
```

Notice the beans configured for supporting JSON in our web application. The only part related to exception handling is the simpleMappingExceptionResolver bean definition where we are defining generic_error.jsp as the view page for Exception class. This make sure that any exception not handled by our application will not result in sending server generated error page as the response.

Spring MVC Exception Handling JSP View Pages

It's time to look into the last part of our application, our view pages that will be used in our application.

home.jsp code:

```
<%@ taglib uri="http://java.sun.com/jsp/jstl/core" prefix="c" %>
<%@ page session="false" %>
<html>
<head>
        <title>Home</title>
</head>
<body>
        <h3>Hello ${employee.name}!</h3><br>
        <h4>Your ID is ${employee.id}</h4>
</body>
</html>
```

home.jsp is used to respond with valid data, i.e when we get id as 10 in the client request.

404.jsp code:

```
<%@ page language="java" contentType="text/html; charset=UTF-8"
    pageEncoding="UTF-8"%>
<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN"
"http://www.w3.org/TR/html4/loose.dtd">
<html>
```

```
<head>
<meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
<title>404 Error Page</title>
</head>
<body>

<h2>Resource Not Found Error Occured, please contact support.</h2>

</body>
</html>
```

404.jsp is used for generating view for 404 http status code, for our implementation this should be the response when we get id as 3 in client request.

error.jsp code:

```
<%@ page language="java" contentType="text/html; charset=UTF-8"
    pageEncoding="UTF-8"%>
<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN"
"http://www.w3.org/TR/html4/loose.dtd">
<%@ taglib uri="http://java.sun.com/jsp/jstl/core" prefix="c" %>
<html>
<head>
<meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
<title>Error Page</title>
</head>
<body>
<h2>Application Error, please contact support.</h2>

<h3>Debug Information:</h3>

Requested URL= ${url}<br><br>

Exception= ${exception.message}<br><br>

<strong>Exception Stack Trace</strong><br>
<c:forEach items="${exception.stackTrace}" var="ste">
        ${ste}
```

error.jsp is used when our controller class request handler method is throwing EmployeeNotFoundException. We should get this page in response when id value is 1 in the client request.

database_error.jsp code:

```
<%@ page language="java" contentType="text/html; charset=UTF-8"
    pageEncoding="UTF-8"%>
<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN"
"http://www.w3.org/TR/html4/loose.dtd">
<html>
<head>
<meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
<title>Database Error Page</title>
</head>
<body>

<h2>Database Error, please contact support.</h2>

</body>
</html>
```

database_error.jsp is used when our application is throwing SQLException, as configured in GlobalExceptionHandler class. We should get this page as response when id value is 2 in the client request.

generic_error.jsp code:

```
<%@ page language="java" contentType="text/html; charset=UTF-8"
    pageEncoding="UTF-8"%>
<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN"
"http://www.w3.org/TR/html4/loose.dtd">
<html>
<head>
<meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
<title>Generic Error Page</title>
</head>
<body>

<h2>Unknown Error Occured, please contact support.</h2>

</body>
</html>
```

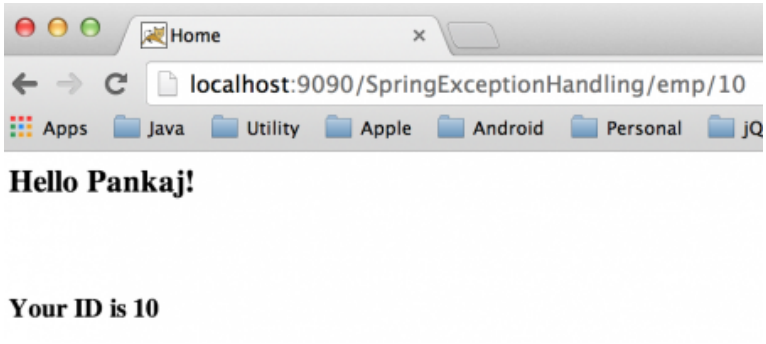
This should be the page as response when any exception occurs not handled by our application code and simpleMappingExceptionResolver bean takes care of that. We should get this page as response when id value in client request is anything other than 1,2,3 or 10.

Running the Spring MVC Exception Handling Application

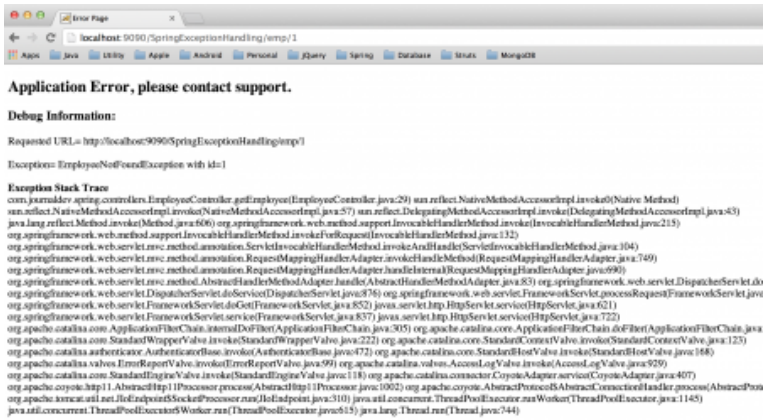
Just deploy the application in the servlet container you are using, I am using Apache Tomcat 7 for this example.

Below images show the different response pages returned by our application based on the id value.

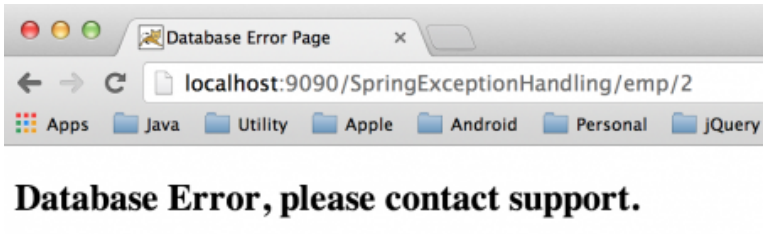
ID=10, valid response.



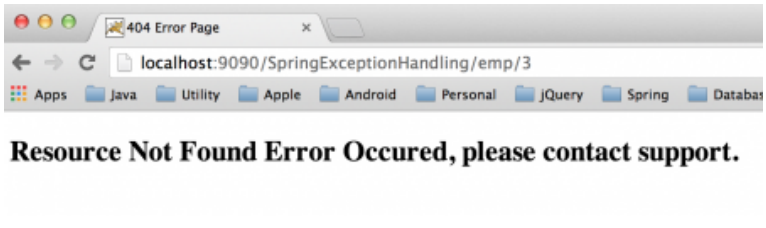
ID=1, controller based exception handler used



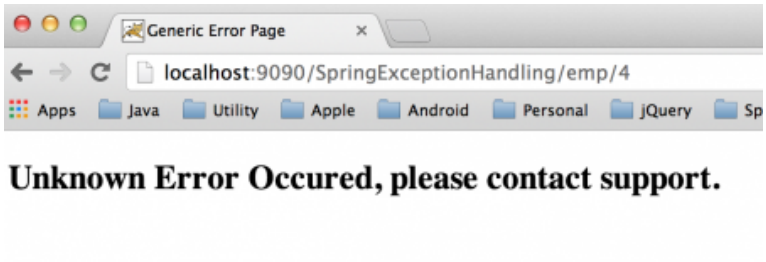
ID=2, global exception handler used with view as response



ID=3, 404 error page used



ID=4, simpleMappingExceptionResolver used for response view



As you can see that we got the expected response in all the cases.

Spring Exception Handler JSON Response

We are almost done with our tutorial, except the last bit where I will explain how to send JSON response from the exception handler methods.

Our application has all the JSON dependencies and jsonMessageConverter is configured, all we need to implement the exception handler method.

For simplicity, I will rewrite the EmployeeController handleEmployeeNotFoundException() method to return JSON response.

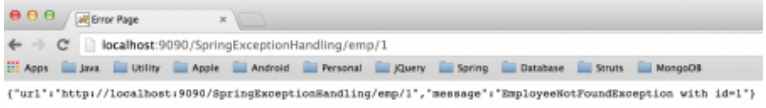
Just update EmployeeController exception handler method with below code and deploy the application again.

```
        @ExceptionHandler(EmployeeNotFoundException.class)
        public @ResponseBody ExceptionJSONInfo
handleEmployeeNotFoundException(HttpServletRequest request, Exception ex){

                ExceptionJSONInfo response = new ExceptionJSONInfo();
                response.setUrl(request.getRequestURL().toString());
                response.setMessage(ex.getMessage());

                return response;
        }
```

Now when we use id as 1 in client request, we get following JSON response as shown in the below image.



That's all for Spring Exception Handling and Spring MVC Exception Handling, please download the application from below URL and play around with it to learn more.

Download Spring Exception Handling Project

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About Pankaj

If you have come this far, it means that you liked what you are reading. Why not reach little more and connect with me directly on **Google Plus**, **Facebook** or **Twitter**. I would love to hear your thoughts and opinions on my articles directly.

Recently I started creating video tutorials too, so do check out my videos on **Youtube**.

FILED UNDER: SPRING

Comments

Mangesh Pawar says
AUGUST 14, 2017 AT 6:38 AM
Could you please tell us : how to achive Global Exception handling from one maven submodule to other.
For EX. A is parent module having GlobalEXception handler using @ControllerAdvice.
and i want to use that exception handling in second module B how can i use it.
Reply

kapil says
APRIL 26, 2017 AT 12:48 AM
Hi Pankaj,
I am getting the below exception in EmployeeController as below. I have deployed my app in tomcat. I amusing tomcat 8.0 & jdk 1.8:-
Apr 26, 2017 1:14:40 PM org.apache.catalina.core.StandardWrapperValve invoke
SEVERE: Allocate exception for servlet appServlet
java.lang.NoClassDefFoundError: Could not initialize class com.spring.Controllers.EmployeeController
Reply

Nikhil says
JANUARY 6, 2017 AT 3:40 AM
Dear Pankaj,
Can I put the following code into MySimpleMappingExceptionResolver if I am extending AbstractHandlerExceptionResolver
ModelAndView modelAndView = new ModelAndView();
modelAndView.addObject("exception", ex);
modelAndView.addObject("url", request.getRequestURL());
modelAndView.setViewName("error");
return modelAndView;
Reply

Venkat says
DECEMBER 28, 2016 AT 5:41 AM
hi Pankaj,
i need a helf from you sir please Give information about backend validation with spring , and give one example
Reply

Venkat says
DECEMBER 28, 2016 AT 5:39 AM
hii Pankaj ,
need a helf from you regarding spring with backend example
Reply

Melwin says
NOVEMBER 15, 2016 AT 5:02 AM
Hi Pankaj,
Great article! I was just wondering as to how the whole process works for an exception that is thrown at the service or dao layer. Any thoughts would be useful!
Thanks
Reply

Nijan says
NOVEMBER 8, 2016 AT 5:51 AM
how to handle exception at service & dao layer
Reply

siva says
SEPTEMBER 28, 2015 AT 10:56 PM
I want to handle the custom exceptions from Filters . @ControllerAdvice is catching the exceptions raised at controller level only . Please suggest annotations or way how to catch custom exceptions from java filters or interceptors . Thanks in advance.
Reply

bala says
SEPTEMBER 17, 2015 AT 11:48 PM
it works for me thanks
Reply

Shiba Sankar Adak says
JULY 9, 2015 AT 2:43 AM

It is excellent article.

Reply

Kiran Kumar Panda says

JULY 7, 2015 AT 8:20 PM

Awesome tutorial. Thanks for sharing such wonderful contents.

Reply

Andrey says

JUNE 30, 2015 AT 3:33 PM

Dear Pankaj,

first thank you for your excellent website. I learn quite a lot from your articles, and greatly appreciate your efforts.

Regarding this particular article.

Whatever idea from it I tried (either returning jsp or JSON when exception is raised) I see that no errors in web server log (and I see there correct exception message logged) but … no jsp or JSON shown on GUI.

What might be the problem in your opinion?

I use Angular JS as controller for the front end

Reply

vineetha says

MAY 26, 2015 AT 11:00 AM

Excellent tutorial.. Thanks…

Reply

Andre says

MAY 4, 2015 AT 6:51 AM

Stunning article.

See a lot of demo stuff where the custom exception extends runtime exception. Problem with that is that no checking is done by IDE or compiler that there is a proper handler for the exception.

This is just brilliant!

Tks

Reply

Deepak Jain says
MARCH 31, 2015 AT 4:59 AM
I am fresher in spring,but i am professional in struts,when i start a new application,which point i focus.
Reply

deepak says
MARCH 31, 2015 AT 4:53 AM
I am fresher in spring,whats the problem face when start spring with hibernate application.
Reply

Ganesh says
MARCH 25, 2015 AT 6:24 AM
Hi Pankaj,
Is it possible to return JSON for @ResponseStatus(value=HttpStatus.NOT_FOUND) ?
Reply

Flávio Aparecido Ribeiro says
FEBRUARY 16, 2015 AT 7:08 PM
Thank you very much Pankaj. You are helping me a lot with my projects.
Reply

sk says
FEBRUARY 14, 2015 AT 11:47 AM
hi Pankaj,
I need to write exception handler whenever a validation exception occurs (@Valid) when an improper request(argument) is passed on to controller. I need to return three things the exception , error message and failed request back. I am not getting the proper way to do it using a generic class like controlleradvice , can you please help me.
Thanks,
Sk
Reply

lamnv says

JANUARY 14, 2015 AT 11:58 PM

Hi Pankaj.

I have a problem with Global Exception Handler. I need to handling 2 custom exception extend from RuntimeException. So I create globalExceptionHandler class with 2 function to handle there exception with @ControllerAdvice. But only one method invoke even I try to throw 2 exception. What's wrong with my code?

Thank for your's reply.

Reply

Pankaj says

JANUARY 15, 2015 AT 10:36 AM

Please paste ur both methods signature, with annotation.

Reply

krishna REddy says

JUNE 3, 2014 AT 3:34 AM

Can u tell me the code what i need to write in MySimpleMappingExceptionResolver.java file.

Reply

xiaoymin says

JANUARY 10, 2015 AT 5:33 AM

hi,this is my code about MySimpleMappingExceptionResolver.java:

```
public class MySimpleMappingExceptionResolver extends SimpleMappingExceptionResolver{
@Override
protected ModelAndView doResolveException(HttpServletRequest request,
HttpServletResponse response, Object handler, Exception ex) {
String viewName=determineViewName(ex, request);
System.out.println("viewName:"+viewName);
if (viewName!=null) {
Integer statusCode = super.determineStatusCode(request, viewName);
if (statusCode != null) {
applyStatusCodeIfPossible(request, response, statusCode);
}
request.setAttribute("error", ex.getMessage());
return getModelAndView(viewName, ex, request);
}
return null;
}
}
```

Reply

Nikhil says
JANUARY 6, 2017 AT 3:55 AM
Getting an error in servlet-context.xml
No setter found for defaultErrorView and for exceptionMappings..
Reply

krishna says
JUNE 3, 2014 AT 3:32 AM
Whats the code i need to write in MySimpleMappingExceptionResolver class.
Reply

krishna kumar says
APRIL 7, 2014 AT 6:33 AM
I am throwing a runtime exception in a submit form and i want to return to the same page because an exception has occured. But by following the process u have specified above we can return to a new page but not the same page.
I want my form after thowing exception to be returned to the same page showing some message(like Server not responding) to the user. Can u please help me.
Reply

Pankaj says
APRIL 7, 2014 AT 2:58 PM
Your requirement seems to be validation related, you should handle it in the controller handler method, something like form validation.
Reply

Leave a Reply

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