



Red Hat JBoss Fuse 7.0-TP

Deploying into Spring Boot

Building and running Spring Boot applications in standalone mode

Red Hat JBoss Fuse 7.0-TP Deploying into Spring Boot

Building and running Spring Boot applications in standalone mode

Legal Notice

Copyright © 2018 Red Hat, Inc.

The text of and illustrations in this document are licensed by Red Hat under a Creative Commons Attribution-Share Alike 3.0 Unported license ("CC-BY-SA"). An explanation of CC-BY-SA is available at

<http://creativecommons.org/licenses/by-sa/3.0/>

. In accordance with CC-BY-SA, if you distribute this document or an adaptation of it, you must provide the URL for the original version.

Red Hat, as the licensor of this document, waives the right to enforce, and agrees not to assert, Section 4d of CC-BY-SA to the fullest extent permitted by applicable law.

Red Hat, Red Hat Enterprise Linux, the Shadowman logo, JBoss, OpenShift, Fedora, the Infinity logo, and RHCE are trademarks of Red Hat, Inc., registered in the United States and other countries.

Linux ® is the registered trademark of Linus Torvalds in the United States and other countries.

Java ® is a registered trademark of Oracle and/or its affiliates.

XFS ® is a trademark of Silicon Graphics International Corp. or its subsidiaries in the United States and/or other countries.

MySQL ® is a registered trademark of MySQL AB in the United States, the European Union and other countries.

Node.js ® is an official trademark of Joyent. Red Hat Software Collections is not formally related to or endorsed by the official Joyent Node.js open source or commercial project.

The OpenStack ® Word Mark and OpenStack logo are either registered trademarks/service marks or trademarks/service marks of the OpenStack Foundation, in the United States and other countries and are used with the OpenStack Foundation's permission. We are not affiliated with, endorsed or sponsored by the OpenStack Foundation, or the OpenStack community.

All other trademarks are the property of their respective owners.

Abstract

This guide explains how to build Spring Boot applications that are packaged as Jar files and run directly in a JVM (standalone mode).

Table of Contents

CHAPTER 1. GETTING STARTED WITH SPRING BOOT	3
1.1. OVERVIEW OF THE CIRCUIT BREAKER BOOSTER	3
1.2. PREREQUISITES	3
1.3. GENERATE THE BOOSTER PROJECT	3
1.4. BUILD AND RUN THE BOOSTER	4
CHAPTER 2. DEPLOYMENT OPTIONS	6
2.1. STANDALONE DEPLOYMENT	6
2.2. OPENSIFT DEPLOYMENT	6
CHAPTER 3. BUILDING WITH MAVEN	7
3.1. GENERATING A MAVEN PROJECT	7
3.1.1. Project generator at launch.opensift.io	7
3.1.2. Fuse tooling wizard in Developer Studio	7
3.2. BOM FILE	7
3.3. SPRING BOOT MAVEN PLUG-IN	8
CHAPTER 4. APACHE CAMEL IN SPRING BOOT	10
4.1. INTRODUCTION TO CAMEL SPRING BOOT	10
4.2. INTRODUCTION TO CAMEL SPRING BOOT STARTER	10
4.3. AUTO-CONFIGURED CAMEL CONTEXT	11
4.4. AUTO-DETECTING CAMEL ROUTES	11
4.5. CAMEL PROPERTIES	12
4.6. CUSTOM CAMEL CONTEXT CONFIGURATION	12
4.7. DISABLING JMX	13
4.8. AUTO-CONFIGURED CONSUMER AND PRODUCER TEMPLATES	13
4.9. AUTO-CONFIGURED TYPECONVERTER	14
4.10. SPRING TYPE CONVERSION API BRIDGE	14
4.11. DISABLING TYPE CONVERSIONS FEATURES	15
4.12. ADDING XML ROUTES	15
4.13. ADDING XML REST-DSL	15
4.14. SEE ALSO	16
CHAPTER 5. PREPARING TO USE MAVEN	17
5.1. OVERVIEW	17
5.2. PREREQUISITES	17
5.3. ADDING THE RED HAT MAVEN REPOSITORIES	17
5.4. ARTIFACTS	19
5.5. MAVEN COORDINATES	19
APPENDIX A. SPRING BOOT MAVEN PLUG-IN	21
A.1. SPRING BOOT MAVEN PLUGIN OVERVIEW	21
A.2. GOALS	21
A.3. USAGE	21

CHAPTER 1. GETTING STARTED WITH SPRING BOOT

1.1. OVERVIEW OF THE CIRCUIT BREAKER BOOSTER

The [Netflix/Hystrix](#) circuit breaker component enables distributed applications to cope with interruptions to network connectivity and temporary unavailability of backend services. The basic idea of the circuit breaker pattern is that the loss of a dependent service is detected automatically and an alternative behavior can be programmed, in case the backend service is temporarily unavailable.

The JBoss Fuse circuit breaker booster consists of two related services:

- A *name service*, which returns a name to greet, and
- A *greetings service*, which invokes the name service to get a name and then returns the string, `Hello, NAME`.

In this demonstration, the Hystrix circuit breaker is inserted between the greetings service and the name service. If the name service becomes unavailable, the greetings service can fall back to an alternative behavior and respond to the client immediately, instead of blocking while it waits for the name service to restart.

1.2. PREREQUISITES

To build and run the booster demonstration, install the following prerequisites:

- A supported version of the Java Developer Kit (JDK). See the [Supported Configurations](#) page for details.
- Apache Maven 3.3.x or later. See the Maven [Download](#) page.

1.3. GENERATE THE BOOSTER PROJECT

To generate the circuit breaker booster project, perform the following steps:

1. Navigate to <https://developers.redhat.com/launch>.
2. Click **LAUNCH YOUR PROJECT**.
3. The launcher wizard prompts you to log in to your Red Hat account. Click the **Log in or register** button to log in.
4. On the **Deployment type** page, click **I will build and run locally**.
5. On the **Mission** page, select the **Circuit Breaker** mission and click **Next**.
6. On the **Runtime** page, select the **Fuse runtime** and click **Next**.
7. On the **Project Info** page, accept the default settings for the **Runtime Version**, **Group Id**, **Artifact Id**, and **Version**.
8. Click **Next**.
9. On the **Review Summary** page, click **Download as ZIP File** to download the generated project.

10. After downloading the ZIP file, use an archive utility to extract the generated project to a convenient location on your local filesystem.

1.4. BUILD AND RUN THE BOOSTER

To build and run the booster project, perform the following steps:

1. Open a shell prompt and build the project from the command line, using Maven:

```
cd booster-circuit-breaker-spring-boot
mvn clean package
```

2. Open a new shell prompt and start the name service, as follows:

```
cd name-service
mvn spring-boot:run -DskipTests -Dserver.port=8081
```

As Spring Boot starts up, you should see some output like the following:

```
...
2017-12-08 15:44:24.223 INFO 22758 --- [           main]
o.a.camel.spring.SpringCamelContext : Total 1 routes, of which
1 are started
2017-12-08 15:44:24.227 INFO 22758 --- [           main]
o.a.camel.spring.SpringCamelContext : Apache Camel 2.20.0
(CamelContext: camel-1) started in 0.776 seconds
2017-12-08 15:44:24.234 INFO 22758 --- [           main]
org.jboss.fuse.boosters.cb.Application : Started Application in
4.137 seconds (JVM running for 4.744)
```

3. Open a new shell prompt and start the greetings service, as follows:

```
cd greetings-service
mvn spring-boot:run -DskipTests
```

As Spring Boot starts up, you should see some output like the following:

```
...
2017-12-08 15:46:58.521 INFO 22887 --- [           main]
o.a.c.c.s.CamelHttpTransportServlet : Initialized
CamelHttpTransportServlet[name=CamelServlet, contextPath=]
2017-12-08 15:46:58.524 INFO 22887 --- [           main]
s.b.c.e.t.TomcatEmbeddedServletContainer : Tomcat started on
port(s): 8080 (http)
2017-12-08 15:46:58.536 INFO 22887 --- [           main]
org.jboss.fuse.boosters.cb.Application : Started Application in
6.263 seconds (JVM running for 6.819)
```

4. The greetings service exposes a REST endpoint at the URL, <http://localhost:8080/camel/greetings>. You can invoke the REST endpoint either from a Web browser or from a shell prompt, using the `curl` command, as follows:


```
$ curl http://localhost:8080/camel/greetings
{"greetings":"Hello, Jacopo"}
```

- To demonstrate the circuit breaker functionality provided by Camel Hystrix, kill the backend name service by typing Ctrl-C in the window of the shell prompt where the name service is running.
- Now that the name service is unavailable, the circuit breaker kicks in to prevent the greetings service from hanging when it is invoked. Invoke the greetings REST endpoint using the `curl` command, as follows:

```
$ curl http://localhost:8080/camel/greetings
{"greetings":"Hello, default fallback"}
```

The log in the window where the greetings service is running shows the following sequence of messages:

```
2017-12-08 16:38:30.483 INFO 23579 --- [-CamelHystrix-2] route2
: Try to call name Service
2017-12-08 16:38:30.488 INFO 23579 --- [-CamelHystrix-2]
o.a.c.httpclient.HttpMethodDirector : I/O exception
(java.net.ConnectException) caught when processing request:
Connection refused (Connection refused)
2017-12-08 16:38:30.488 INFO 23579 --- [-CamelHystrix-2]
o.a.c.httpclient.HttpMethodDirector : Retrying request
2017-12-08 16:38:30.489 INFO 23579 --- [-CamelHystrix-2]
o.a.c.httpclient.HttpMethodDirector : I/O exception
(java.net.ConnectException) caught when processing request:
Connection refused (Connection refused)
2017-12-08 16:38:30.489 INFO 23579 --- [-CamelHystrix-2]
o.a.c.httpclient.HttpMethodDirector : Retrying request
2017-12-08 16:38:30.489 INFO 23579 --- [-CamelHystrix-2]
o.a.c.httpclient.HttpMethodDirector : I/O exception
(java.net.ConnectException) caught when processing request:
Connection refused (Connection refused)
2017-12-08 16:38:30.489 INFO 23579 --- [-CamelHystrix-2]
o.a.c.httpclient.HttpMethodDirector : Retrying request
2017-12-08 16:38:30.495 INFO 23579 --- [-CamelHystrix-2] route2
: We are falling back!!!!
```

- For more information about this example, visit the Circuit Breaker Mission page at <http://localhost:8080/> (while the `greetings-service` is running). This page provides a link to the Hystrix dashboard, which monitors the state of the circuit breaker.

CHAPTER 2. DEPLOYMENT OPTIONS

The following Spring Boot deployment options are supported in JBoss Fuse:

- [Section 2.1, “Standalone deployment”](#)
- [Section 2.2, “OpenShift deployment”](#)

2.1. STANDALONE DEPLOYMENT

In standalone deployment mode, a Spring Boot application is packaged as a Jar file and runs directly inside the Java Virtual Machine (JVM). That is, the Spring Boot application can be run directly using the `java` command with the `-jar` option – for example:

```
java -jar SpringBootApplication.jar
```

Where Spring Boot provides the main class for the executable Jar. This approach to packaging and running the application is consistent with the microservices philosophy, where a service is packaged with the minimum set of requirements. The container is also minimal, being just the JVM itself.

The following elements are required for building a Spring Boot standalone application in JBoss Fuse:

- *The JBoss Fuse Bill of Materials (BOM)*– defines a carefully curated set of dependencies from the Red Hat Maven repository. The BOM exploits Maven’s *dependency management* mechanism to define the appropriate versions of Maven dependencies.



NOTE

Only dependencies defined in the JBoss Fuse BOM are supported by Red hat.

- *The Spring Boot Maven Plug-In*– implements the build process for a standalone Spring Boot application in Maven. This plug-in is responsible for packaging your Spring Boot application as an executable Jar file.

2.2. OPENSIFT DEPLOYMENT

In OpenShift deployment mode, a Spring Boot application is packaged as an OpenShift application and then uploaded to an OpenShift cluster, where it runs in one or more pods. This mode of deployment has the advantage of being highly scalable, exploiting the on-premises cloud provided by the OpenShift Container Platform (OCP) product.

For more details about the OpenShift mode of deployment, see the "Fuse Integration Services" guide.

The following elements are required for building a Spring Boot application for OpenShift in JBoss Fuse:

- *The JBoss Fuse Bill of Materials (BOM)*– only dependencies defined in the JBoss Fuse BOM are supported by Red hat.
- *The Spring Boot Maven plug-in*– builds the Spring Boot executable Jar file, which is an intermediate step in the process of building an application for OpenShift.
- *The Fabric8 Maven plug-in*– automates the entire process of building, packaging, and deploying an application to OpenShift.

CHAPTER 3. BUILDING WITH MAVEN

The standard approach to developing applications for Spring Boot in JBoss Fuse is to use the Apache Maven build tool and to structure your source code as a Maven project. JBoss Fuse provides Maven quickstarts to get you started quickly and many of the JBoss Fuse build tools are provided as Maven plug-ins. For this reason, it is highly recommended that you adopt Maven as the build tool for Spring Boot projects in JBoss Fuse.

3.1. GENERATING A MAVEN PROJECT

JBoss Fuse provides a selection of quickstarts, based on Maven archetypes, which you can use to generate an initial Maven project for a Spring Boot application. To save you having to remember the location information and versions for various Maven archetypes, JBoss Fuse provides tooling to help you generate Maven projects for standalone Spring Boot projects.

3.1.1. Project generator at launch.openshift.io

The quickest way to get started with Spring Boot standalone in JBoss Fuse is to navigate to launch.openshift.io and follow the instructions for the Spring Boot standalone runtime, to generate a new Maven project. After following the on-screen instructions, you will be prompted to download an archive file, which contains a complete Maven project that you can build and run locally.

3.1.2. Fuse tooling wizard in Developer Studio

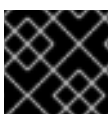
Alternatively, you can download and install Red Hat JBoss Developer Studio (which includes Fuse Tooling). Using the **Fuse New Integration Project** wizard, you can generate a new Spring Boot standalone project and continue to develop inside the Eclipse-based IDE.

3.2. BOM FILE

The [Maven Bill of Materials \(BOM\)](#) file is the first crucial element of a Spring Boot project for JBoss Fuse. The purpose of a BOM file is to provide a curated set of Maven dependency versions that work well together, saving you from having to define versions individually for every Maven artifact.

The JBoss Fuse BOM offers the following advantages:

- Defines versions for all Maven dependencies related to JBoss Fuse, saving you the trouble of doing this yourself.
- Defines a curated set of dependencies that are fully tested and supported for a specific version of JBoss Fuse.
- Simplifies upgrades of JBoss Fuse – to upgrade to a later patch of JBoss Fuse, simply change the version of the BOM file.



IMPORTANT

Only the set of dependencies defined by a JBoss Fuse BOM are supported by Red Hat.

A BOM file is incorporated into your Maven project by specifying a `dependencyManagement` element in your project's `pom.xml` file (or, possibly, in a parent POM file), as shown in the following example:

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
```

```

<project ...>
  ...
  <properties>
    <project.build.sourceEncoding>UTF-8</project.build.sourceEncoding>

    <!-- configure the versions you want to use here -->
    <fabric8.version>3.0.8.fuse-000023-redhat-2</fabric8.version>
    <spring-boot.version>1.5.8.RELEASE</spring-boot.version>

    <maven-compiler-plugin.version>3.3</maven-compiler-plugin.version>
    <maven-surefire-plugin.version>2.18.1</maven-surefire-plugin.version>
  </properties>

  <dependencyManagement>
    <dependencies>
      <dependency>
        <groupId>io.fabric8</groupId>
        <artifactId>fabric8-project-bom-camel-spring-boot</artifactId>
        <version>${fabric8.version}</version>
        <type>pom</type>
        <scope>import</scope>
      </dependency>
    </dependencies>
  </dependencyManagement>
  ...
</project>

```

After specifying the BOM using the dependency management mechanism, it becomes possible to add Maven dependencies to your POM *without* specifying the version of the artifact. For example, to add a dependency for the `camel-hystrix` component, you would add the following XML fragment to the `dependencies` element in your POM:

```

<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-hystrix-starter</artifactId>
</dependency>

```

Note how the Camel artifact ID is specified with the `-starter` suffix – that is, you specify the Camel Hystrix component as `camel-hystrix-starter`, not as `camel-hystrix`. The Camel starter components are packaged in a way that is optimized for the Spring Boot environment. For more details, see [Chapter 4, Apache Camel in Spring Boot](#).

3.3. SPRING BOOT MAVEN PLUG-IN

The Spring Boot Maven plug-in is the second crucial element of a Spring Boot project for JBoss Fuse. This Maven plug-in is provided by Spring Boot and it is a developer utility for building and running a Spring Boot project:

- *Building* – create an executable Jar package for your Spring Boot application by entering `mvn package` in your project directory. The output of the build is placed in the `target/` subdirectory of your Maven project.
- *Running* – for convenience, you can run the newly-built application with the command, `mvn spring-boot:start`.

For more details about the Spring Boot Maven plug-in, see [Appendix A, Spring Boot Maven Plug-In](#).

To incorporate the Spring Boot Maven plug-in into your project POM file, add the plug-in configuration to the `project/build/plugins` section of your `pom.xml` file, as shown in the following example:

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<project ...>
  ...
  <properties>
    <project.build.sourceEncoding>UTF-8</project.build.sourceEncoding>

    <!-- configure the versions you want to use here -->
    <fabric8.version>3.0.8.fuse-000023-redhat-2</fabric8.version>
    <spring-boot.version>1.5.8.RELEASE</spring-boot.version>

    <maven-compiler-plugin.version>3.3</maven-compiler-plugin.version>
    <maven-surefire-plugin.version>2.18.1</maven-surefire-plugin.version>
  </properties>
  ...
  <build>
    <pluginManagement>
      <plugins>

      </plugins>
    </pluginManagement>
    <plugins>
      <plugin>
        <groupId>org.springframework.boot</groupId>
        <artifactId>spring-boot-maven-plugin</artifactId>
        <executions>
          <execution>
            <goals>
              <goal>repackage</goal>
            </goals>
          </execution>
        </executions>
      </plugin>
    </plugins>
  </build>
  ...
</project>
```

Note that the **version** of the `spring-boot-maven-plugin` artifact is not specified in the preceding example, because the version has already been specified by Maven dependency management (see [Section 3.2, “BOM file”](#)).

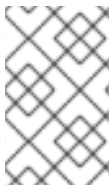
CHAPTER 4. APACHE CAMEL IN SPRING BOOT

4.1. INTRODUCTION TO CAMEL SPRING BOOT

The Camel Spring Boot component provides auto configuration for Apache Camel. Auto-configuration of the Camel context auto-detects Camel routes available in the Spring context and registers the key Camel utilities such as producer template, consumer template, and the type converter as beans.

Every Camel Spring Boot application should use `dependencyManagement` with productized versions, see [quickstart pom](#). Versions that are tagged later can be omitted to not override the versions from BOM.

```
<dependencyManagement>
  <dependencies>
    <dependency>
      <groupId>io.fabric8</groupId>
      <artifactId>fabric8-project-bom-camel-spring-boot</artifactId>
      <version>${fabric8.version}</version>
      <type>pom</type>
      <scope>import</scope>
    </dependency>
  </dependencies>
</dependencyManagement>
```



NOTE

`camel-spring-boot` jar comes with the `spring.factories` file which allows you to add that dependency into your classpath and hence Spring Boot will automatically auto-configure Camel.

4.2. INTRODUCTION TO CAMEL SPRING BOOT STARTER

Apache Camel includes a Spring Boot starter module that allows you to develop Spring Boot applications using starters.



NOTE

For more details, see [sample application](#) in the source code.

To use the starter, add the following snippet to your Spring Boot `pom.xml` file:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-spring-boot-starter</artifactId>
</dependency>
```

The starter allows you to add classes with your Camel routes, as shown in the snippet below. Once these routes are added to the class path the routes are started automatically.

```
package com.example;

import org.apache.camel.builder.RouteBuilder;
import org.springframework.stereotype.Component;
```

```

@Component
public class MyRoute extends RouteBuilder {

    @Override
    public void configure() throws Exception {
        from("timer:foo").to("log:bar");
    }
}

```



NOTE

You can customize the Camel application in the `application.properties` or `application.yml` file.

4.3. AUTO-CONFIGURED CAMEL CONTEXT

Camel auto-configuration provides a `CamelContext` instance and creates a `SpringCamelContext`. It also initializes and performs shutdown of that context. This Camel context is registered in the Spring application context under `camelContext` bean name and you can access it like other Spring bean.

For example, you can access the `camelContext` as shown below:

```

@Configuration
public class MyAppConfig {

    @Autowired
    CamelContext camelContext;

    @Bean
    MyService myService() {
        return new DefaultMyService(camelContext);
    }
}

```

4.4. AUTO-DETECTING CAMEL ROUTES

Camel auto configuration collects all the `RouteBuilder` instances from the Spring context and automatically injects them into the `CamelContext`. It simplifies the process of creating new Camel route with the Spring Boot starter. You can create the routes by adding the `@Component` annotated class to your classpath.

```

@Component
public class MyRouter extends RouteBuilder {

    @Override
    public void configure() throws Exception {
        from("jms:invoices").to("file:/invoices");
    }
}

```

To create a new route **RouteBuilder** bean in your **@Configuration** class, see below:

```
@Configuration
public class MyRouterConfiguration {

    @Bean
    RoutesBuilder myRouter() {
        return new RouteBuilder() {

            @Override
            public void configure() throws Exception {
                from("jms:invoices").to("file:/invoices");
            }

        };
    }
}
```

4.5. CAMEL PROPERTIES

Spring Boot auto configuration automatically connects to Spring Boot external configuration such as properties placeholders, OS environment variables, or system properties with Camel properties support.

These properties are defined in `application.properties` file:

```
route.from = jms:invoices
```

Use as system property

```
java -Droute.to=jms:processed.invoices -jar mySpringApp.jar
```

Use as placeholders in Camel route:

```
@Component
public class MyRouter extends RouteBuilder {

    @Override
    public void configure() throws Exception {
        from("{{route.from}}").to("{{route.to}}");
    }

}
```

4.6. CUSTOM CAMEL CONTEXT CONFIGURATION

To perform operations on **CamelContext** bean created by Camel auto configuration, you need to register **CamelContextConfiguration** instance in your Spring context as shown below:

```
@Configuration
public class MyAppConfig {
```

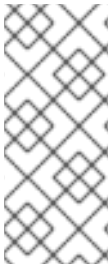


```

...

@Bean
CamelContextConfiguration contextConfiguration() {
    return new CamelContextConfiguration() {
        @Override
        void beforeApplicationStart(CamelContext context) {
            // your custom configuration goes here
        }
    };
}
}

```



NOTE

The method `CamelContextConfiguration` and `beforeApplicationStart(CamelContext)` will be called before the Spring context is started, so the `CamelContext` instance passed to this callback is fully auto-configured. You can add many instances of `CamelContextConfiguration` into your Spring context and all of them will be executed.

4.7. DISABLING JMX

To disable JMX of the auto-configured `CamelContext` use `camel.springboot.jmxEnabled` property as JMX is enabled by default.

For example, you could add the following property to your `application.properties` file:

```
camel.springboot.jmxEnabled = false
```

4.8. AUTO-CONFIGURED CONSUMER AND PRODUCER TEMPLATES

Camel auto configuration provides pre-configured `ConsumerTemplate` and `ProducerTemplate` instances. You can inject them into your Spring-managed beans:

```

@Component
public class InvoiceProcessor {

    @Autowired
    private ProducerTemplate producerTemplate;

    @Autowired
    private ConsumerTemplate consumerTemplate;
    public void processNextInvoice() {
        Invoice invoice = consumerTemplate.receiveBody("jms:invoices",
Invoice.class);
        ...
        producerTemplate.sendBody("netty-http:http://invoicing.com/received/"
+ invoice.id());
    }
}

```

By default consumer templates and producer templates come with the endpoint cache sizes set to 1000. You can change those values using the following Spring properties:

```
camel.springboot.consumerTemplateCacheSize = 100
camel.springboot.producerTemplateCacheSize = 200
```

4.9. AUTO-CONFIGURED TYPECONVERTER

Camel auto configuration registers a `TypeConverter` instance named `typeConverter` in the Spring context.

```
@Component
public class InvoiceProcessor {

    @Autowired
    private TypeConverter typeConverter;

    public long parseInvoiceValue(Invoice invoice) {
        String invoiceValue = invoice.grossValue();
        return typeConverter.convertTo(Long.class, invoiceValue);
    }
}
```

4.10. SPRING TYPE CONVERSION API BRIDGE

Spring consist of [type conversion API](#). Spring API is similar to the Camel [type converter API](#). Due to the similarities between the two APIs Camel Spring Boot automatically registers a bridge converter (`SpringTypeConverter`) that delegates to the Spring conversion API. That means that out-of-the-box Camel will treat Spring Converters similar to Camel.

This allows you to access both Camel and Spring converters using the Camel `TypeConverter` API, as shown below:

```
@Component
public class InvoiceProcessor {

    @Autowired
    private TypeConverter typeConverter;

    public UUID parseInvoiceId(Invoice invoice) {
        // Using Spring's StringToUUIDConverter
        UUID id = invoice.typeConverter.convertTo(UUID.class,
invoice.getId());
    }
}
```

Here, Spring Boot delegates conversion to the Spring's `ConversionService` instances available in the application context. If no `ConversionService` instance is available, Camel Spring Boot auto configuration creates an instance of `ConversionService`.

4.11. DISABLING TYPE CONVERSIONS FEATURES

To disable registering type conversion features of Camel Spring Boot such as `TypeConverter` instance or Spring bridge, set the `camel.springboot.typeConversion` property to `false` as shown below:

```
camel.springboot.typeConversion = false
```

4.12. ADDING XML ROUTES

By default, you can put Camel XML routes in the classpath under the directory `camel`, which `camel-spring-boot` will auto detect and include. From **Camel version 2.17** onwards you can configure the directory name or disable this feature using the configuration option, as shown below:

```
// turn off
camel.springboot.xmlRoutes = false
// scan in the com/foo/routes classpath
camel.springboot.xmlRoutes = classpath:com/foo/routes/*.xml
```



NOTE

The XML files should be Camel XML routes and not `CamelContext` such as:

```
<routes xmlns="http://camel.apache.org/schema/spring">
  <route id="test">
    <from uri="timer://trigger"/>
    <transform>
      <simple>ref:myBean</simple>
    </transform>
    <to uri="log:out"/>
  </route>
</routes>
```

4.13. ADDING XML REST-DSL

By default, you can put Camel Rest-DSL XML routes in the classpath under the directory `camel-rest`, which `camel-spring-boot` will auto detect and include. You can configure the directory name or disable this feature using the configuration option, as shown below:

```
// turn off
camel.springboot.xmlRests = false
// scan in the com/foo/routes classpath
camel.springboot.xmlRests = classpath:com/foo/rests/*.xml
```



NOTE

The Rest-DSL XML files should be Camel XML rests and not `CamelContext` such as:

```
<rests xmlns="http://camel.apache.org/schema/spring">
  <rest>
```

```
<post uri="/persons">
  <to uri="direct:postPersons"/>
</post>
<get uri="/persons">
  <to uri="direct:getPersons"/>
</get>
<get uri="/persons/{personId}">
  <to uri="direct:getPersionId"/>
</get>
<put uri="/persons/{personId}">
  <to uri="direct:putPersionId"/>
</put>
<delete uri="/persons/{personId}">
  <to uri="direct:deletePersionId"/>
</delete>
</rest>
</rests>
```

4.14. SEE ALSO

- [Configuring Camel](#)
- [Component](#)
- [Endpoint](#)
- [Getting Started](#)

CHAPTER 5. PREPARING TO USE MAVEN

5.1. OVERVIEW

This section gives a brief overview of how to prepare Maven for building Red Hat JBoss Fuse projects and introduces the concept of Maven coordinates, which are used to locate Maven artifacts.

5.2. PREREQUISITES

In order to build a project using Maven, you must have the following prerequisites:

- **Maven installation** – Maven is a free, open source build tool from Apache. You can download the latest version from the [Maven download page](#).
- **Network connection** – whilst performing a build, Maven dynamically searches external repositories and downloads the required artifacts on the fly. By default, Maven looks for repositories that are accessed over the Internet. You can change this behavior so that Maven will prefer searching repositories that are on a local network.



NOTE

Maven can run in an offline mode. In offline mode Maven only looks for artifacts in its local repository.

5.3. ADDING THE RED HAT MAVEN REPOSITORIES

In order to access artifacts from the Red Hat Maven repositories, you need to add them to Maven's `settings.xml` file. Maven looks for your `settings.xml` file in the `.m2` directory of the user's home directory. If there is not a user specified `settings.xml` file, Maven will use the system-level `settings.xml` file at `M2_HOME/conf/settings.xml`.

To add the Red Hat repositories to Maven's list of repositories, you can either create a new `.m2/settings.xml` file or modify the system-level settings. In the `settings.xml` file, add `repository` elements for the Red Hat repositories as shown in [Adding the Red Hat JBoss Fuse Repositories to Maven](#).

Adding the Red Hat JBoss Fuse Repositories to Maven

```
<?xml version="1.0"?>
<settings>

  <profiles>
    <profile>
      <id>extra-repos</id>
      <activation>
        <activeByDefault>>true</activeByDefault>
      </activation>
      <repositories>
        <repository>
          <id>redhat-ga-repository</id>
          <url>https://maven.repository.redhat.com/ga</url>
          <releases>
            <enabled>>true</enabled>
          </releases>
        </repository>
      </repositories>
    </profile>
  </profiles>
</settings>
```

```

        </releases>
        <snapshots>
            <enabled>>false</enabled>
        </snapshots>
    </repository>
    <repository>
        <id>redhat-ea-repository</id>

<url>https://maven.repository.redhat.com/earlyaccess/all</url>
        <releases>
            <enabled>>true</enabled>
        </releases>
        <snapshots>
            <enabled>>false</enabled>
        </snapshots>
    </repository>
    <repository>
        <id>jboss-public</id>
        <name>JBoss Public Repository Group</name>

<url>https://repository.jboss.org/nexus/content/groups/public/</url>
    </repository>
</repositories>
<pluginRepositories>
    <pluginRepository>
        <id>redhat-ga-repository</id>
        <url>https://maven.repository.redhat.com/ga</url>
        <releases>
            <enabled>>true</enabled>
        </releases>
        <snapshots>
            <enabled>>false</enabled>
        </snapshots>
    </pluginRepository>
    <pluginRepository>
        <id>redhat-ea-repository</id>

<url>https://maven.repository.redhat.com/earlyaccess/all</url>
        <releases>
            <enabled>>true</enabled>
        </releases>
        <snapshots>
            <enabled>>false</enabled>
        </snapshots>
    </pluginRepository>
    <pluginRepository>
        <id>jboss-public</id>
        <name>JBoss Public Repository Group</name>

<url>https://repository.jboss.org/nexus/content/groups/public</url>
    </pluginRepository>
</pluginRepositories>
</profile>
</profiles>

<activeProfiles>

```

```

    <activeProfile>extra-repos</activeProfile>
  </activeProfiles>

</settings>

```

5.4. ARTIFACTS

The basic building block in the Maven build system is an *artifact*. The output of an artifact, after performing a Maven build, is typically an archive, such as a JAR or a WAR.

5.5. MAVEN COORDINATES

A key aspect of Maven functionality is the ability to locate artifacts and manage the dependencies between them. Maven defines the location of an artifact using the system of *Maven coordinates*, which uniquely define the location of a particular artifact. A basic coordinate tuple has the form, **{*groupId*, *artifactId*, *version*}**. Sometimes Maven augments the basic set of coordinates with the additional coordinates, *packaging* and *classifier*. A tuple can be written with the basic coordinates, or with the additional *packaging* coordinate, or with the addition of both the *packaging* and *classifier* coordinates, as follows:

```

groupId:artifactId:version
groupId:artifactId:packaging:version
groupId:artifactId:packaging:classifier:version

```

Each coordinate can be explained as follows:

groupId

Defines a scope for the name of the artifact. You would typically use all or part of a package name as a group ID – for example, **org.fusesource.example**.

artifactId

Defines the artifact name (relative to the group ID).

version

Specifies the artifact's version. A version number can have up to four parts: **n.n.n.n**, where the last part of the version number can contain non-numeric characters (for example, the last part of **1.0-SNAPSHOT** is the alphanumeric substring, **0-SNAPSHOT**).

packaging

Defines the packaged entity that is produced when you build the project. For OSGi projects, the packaging is **bundle**. The default value is **jar**.

classifier

Enables you to distinguish between artifacts that were built from the same POM, but have different content.

The group ID, artifact ID, packaging, and version are defined by the corresponding elements in an artifact's POM file. For example:

```

<project ... >
  ...
  <groupId>org.fusesource.example</groupId>
  <artifactId>bundle-demo</artifactId>
  <packaging>bundle</packaging>

```

```
<version>1.0-SNAPSHOT</version>
...
</project>
```

For example, to define a dependency on the preceding artifact, you could add the following **dependency** element to a POM:

```
<project ... >
...
<dependencies>
  <dependency>
    <groupId>org.fusesource.example</groupId>
    <artifactId>bundle-demo</artifactId>
    <version>1.0-SNAPSHOT</version>
  </dependency>
</dependencies>
...
</project>
```



NOTE

It is **not** necessary to specify the **bundle** package type in the preceding dependency, because a bundle is just a particular kind of JAR file and **jar** is the default Maven package type. If you do need to specify the packaging type explicitly in a dependency, however, you can use the **type** element.

APPENDIX A. SPRING BOOT MAVEN PLUG-IN

A.1. SPRING BOOT MAVEN PLUGIN OVERVIEW

This appendix describes the Spring Boot Maven Plugin. It provides the Spring Boot support in Maven and allows you to package the executable jar or war archives and run an application **in-place**.

A.2. GOALS

The Spring Boot Plugin includes the following goals:

1. `spring-boot:run` runs your Spring Boot application.
2. `spring-boot:repackage` repackages your `.jar` and `.war` files to be executable.
3. `spring-boot:start` and `spring-boot:stop` both are used to manage the lifecycle of your Spring Boot application.
4. `spring-boot:build-info` generates build information that can be used by the Actuator.

A.3. USAGE

You can find general instructions on how to use the Spring Boot Plugin at:

<http://docs.spring.io/spring-boot/docs/current/maven-plugin/usage.html>.

Following is an example that illustrates the usage of the `spring-boot-maven-plugin` plugin:

```
<project>
  <modelVersion>4.0.0</modelVersion>

  <groupId>io.fabric8.quickstarts</groupId>
  <artifactId>spring-boot-camel</artifactId>
  <version>1.0-SNAPSHOT</version>

  <name>Fabric8 :: Quickstarts :: Spring-Boot :: Camel</name>
  <description>Spring Boot example running a Camel route</description>

  <properties>
    <project.build.sourceEncoding>UTF-8</project.build.sourceEncoding>

    <!-- configure the versions you want to use here -->
    <fabric8.version>3.0.8.fuse-000023-redhat-2</fabric8.version>
    <spring-boot.version>1.5.8.RELEASE</spring-boot.version>

    <!-- maven plugin versions -->
    <fabric8.maven.plugin.version>3.5.33.fuse-000023-redhat-
3</fabric8.maven.plugin.version>
    <maven-compiler-plugin.version>3.3</maven-compiler-plugin.version>
    <maven-surefire-plugin.version>2.18.1</maven-surefire-plugin.version>
  </properties>

  <dependencyManagement>
    <dependencies>
      <dependency>
        <groupId>io.fabric8</groupId>
```

```
        <artifactId>fabric8-project-bom-camel-spring-boot</artifactId>
        <version>${fabric8.version}</version>
        <type>pom</type>
        <scope>import</scope>
    </dependency>
</dependencies>
</dependencyManagement>

<dependencies>

    <!-- Enabling health checks -->
    <dependency>
        <groupId>org.springframework.boot</groupId>
        <artifactId>spring-boot-starter-actuator</artifactId>
    </dependency>
    <dependency>
        <groupId>org.springframework.boot</groupId>
        <artifactId>spring-boot-starter-web</artifactId>
    </dependency>

    <dependency>
        <groupId>org.apache.camel</groupId>
        <artifactId>camel-spring-boot-starter</artifactId>
    </dependency>

    <!-- testing -->
    <dependency>
        <groupId>junit</groupId>
        <artifactId>junit</artifactId>
        <scope>test</scope>
    </dependency>
    <dependency>
        <groupId>org.springframework</groupId>
        <artifactId>spring-test</artifactId>
        <scope>test</scope>
    </dependency>
    <dependency>
        <groupId>org.springframework.boot</groupId>
        <artifactId>spring-boot-starter-test</artifactId>
        <scope>test</scope>
    </dependency>
    <dependency>
        <groupId>org.jboss.arquillian.junit</groupId>
        <artifactId>arquillian-junit-container</artifactId>
        <scope>test</scope>
    </dependency>
    <dependency>
        <groupId>io.fabric8</groupId>
        <artifactId>fabric8-arquillian</artifactId>
        <scope>test</scope>
    </dependency>
</dependencies>

<build>
    <defaultGoal>spring-boot:run</defaultGoal>
</build>
```

```

<plugins>
  <plugin>
    <artifactId>maven-compiler-plugin</artifactId>
    <version>${maven-compiler-plugin.version}</version>
    <configuration>
      <source>1.8</source>
      <target>1.8</target>
    </configuration>
  </plugin>
  <plugin>
    <groupId>org.apache.maven.plugins</groupId>
    <artifactId>maven-surefire-plugin</artifactId>
    <version>${maven-surefire-plugin.version}</version>
    <inherited>>true</inherited>
    <configuration>
      <excludes>
        <exclude>**/*KT.java</exclude>
      </excludes>
    </configuration>
  </plugin>

  <plugin>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-maven-plugin</artifactId>
    <version>${spring-boot.version}</version>
    <executions>
      <execution>
        <goals>
          <goal>repackage</goal>
        </goals>
      </execution>
    </executions>
  </plugin>

  <plugin>
    <groupId>io.fabric8</groupId>
    <artifactId>fabric8-maven-plugin</artifactId>
    <version>${fabric8.maven.plugin.version}</version>
    <executions>
      <execution>
        <goals>
          <goal>resource</goal>
          <goal>build</goal>
        </goals>
      </execution>
    </executions>
  </plugin>
</plugins>
</build>
</project>

```

For more information on Spring Boot Maven Plugin, refer the <http://docs.spring.io/spring-boot/docs/current/maven-plugin> link.

