[Building a RESTful Web Service](https://spring.io/guides/gs/rest-service/)-

Learn how to create a RESTful web service with Spring.

GETTING STARTED

# Building a RESTful Web Service

This guide walks you through the process of creating a "hello world" [RESTful web service](https://spring.io/understanding/REST) with Spring.

## What you’ll build

You’ll build a service that will accept HTTP GET requests at:

http://localhost:8080/greeting

and respond with a [JSON](https://spring.io/understanding/JSON) representation of a greeting:

{"id":1,"content":"Hello, World!"}

You can customize the greeting with an optional name parameter in the query string:

http://localhost:8080/greeting?name=User

The name parameter value overrides the default value of "World" and is reflected in the response:

{"id":1,"content":"Hello, User!"}

## What you’ll need

* About 15 minutes
* A favorite text editor or IDE
* [JDK 1.8](http://www.oracle.com/technetwork/java/javase/downloads/index.html) or later
* [Gradle 2.3+](http://www.gradle.org/downloads) or [Maven 3.0+](https://maven.apache.org/download.cgi)
* You can also import the code straight into your IDE:
  + [Spring Tool Suite (STS)](https://spring.io/guides/gs/sts)
  + [IntelliJ IDEA](https://spring.io/guides/gs/intellij-idea/)

## How to complete this guide

Like most Spring [Getting Started guides](https://spring.io/guides), you can start from scratch and complete each step, or you can bypass basic setup steps that are already familiar to you. Either way, you end up with working code.

To **start from scratch**, move on to [Build with Gradle](https://spring.io/guides/gs/rest-service/#scratch).

To **skip the basics**, do the following:

* [Download](https://github.com/spring-guides/gs-rest-service/archive/master.zip) and unzip the source repository for this guide, or clone it using [Git](https://spring.io/understanding/Git): git clone <https://github.com/spring-guides/gs-rest-service.git>
* cd into gs-rest-service/initial
* Jump ahead to [Create a resource representation class](https://spring.io/guides/gs/rest-service/#initial).

**When you’re finished**, you can check your results against the code in gs-rest-service/complete.

## Build with Gradle

First you set up a basic build script. You can use any build system you like when building apps with Spring, but the code you need to work with [Gradle](http://gradle.org/) and [Maven](https://maven.apache.org/) is included here. If you’re not familiar with either, refer to [Building Java Projects with Gradle](https://spring.io/guides/gs/gradle) or [Building Java Projects with Maven](https://spring.io/guides/gs/maven).

### Create the directory structure

In a project directory of your choosing, create the following subdirectory structure; for example, with mkdir -p src/main/java/hello on \*nix systems:

└── src

└── main

└── java

└── hello

### Create a Gradle build file

Below is the [initial Gradle build file](https://github.com/spring-guides/gs-rest-service/blob/master/initial/build.gradle).

build.gradle

buildscript {

repositories {

mavenCentral()

}

dependencies {

classpath("org.springframework.boot:spring-boot-gradle-plugin:1.5.2.RELEASE")

}

}

apply plugin: 'java'

apply plugin: 'eclipse'

apply plugin: 'idea'

apply plugin: 'org.springframework.boot'

jar {

baseName = 'gs-rest-service'

version = '0.1.0'

}

repositories {

mavenCentral()

}

sourceCompatibility = 1.8

targetCompatibility = 1.8

dependencies {

compile("org.springframework.boot:spring-boot-starter-web")

testCompile('org.springframework.boot:spring-boot-starter-test')

}

The [Spring Boot gradle plugin](https://github.com/spring-projects/spring-boot/tree/master/spring-boot-tools/spring-boot-gradle-plugin) provides many convenient features:

* It collects all the jars on the classpath and builds a single, runnable "über-jar", which makes it more convenient to execute and transport your service.
* It searches for the public static void main() method to flag as a runnable class.
* It provides a built-in dependency resolver that sets the version number to match [Spring Boot dependencies](https://github.com/spring-projects/spring-boot/blob/master/spring-boot-dependencies/pom.xml). You can override any version you wish, but it will default to Boot’s chosen set of versions.

## Build with Maven

## Build with your IDE

## Create a resource representation class

Now that you’ve set up the project and build system, you can create your web service.

Begin the process by thinking about service interactions.

The service will handle GET requests for /greeting, optionally with a name parameter in the query string. The GET request should return a 200 OK response with JSON in the body that represents a greeting. It should look something like this:

{

"id": 1,

"content": "Hello, World!"

}

The id field is a unique identifier for the greeting, and content is the textual representation of the greeting.

To model the greeting representation, you create a resource representation class. Provide a plain old java object with fields, constructors, and accessors for the id and content data:

src/main/java/hello/Greeting.java

package hello;

public class Greeting {

private final long id;

private final String content;

public Greeting(long id, String content) {

this.id = id;

this.content = content;

}

public long getId() {

return id;

}

public String getContent() {

return content;

}

}

|  |  |
| --- | --- |
|  | As you see in steps below, Spring uses the [Jackson JSON](http://wiki.fasterxml.com/JacksonHome) library to automatically marshal instances of type Greeting into JSON. |

Next you create the resource controller that will serve these greetings.

## Create a resource controller

In Spring’s approach to building RESTful web services, HTTP requests are handled by a controller. These components are easily identified by the [@RestController](http://docs.spring.io/spring/docs/current/javadoc-api/org/springframework/web/bind/annotation/RestController.html) annotation, and the GreetingController below handles GET requests for /greeting by returning a new instance of the Greeting class:

src/main/java/hello/GreetingController.java

package hello;

import java.util.concurrent.atomic.AtomicLong;

import org.springframework.web.bind.annotation.RequestMapping;

import org.springframework.web.bind.annotation.RequestParam;

import org.springframework.web.bind.annotation.RestController;

@RestController

public class GreetingController {

private static final String template = "Hello, %s!";

private final AtomicLong counter = new AtomicLong();

@RequestMapping("/greeting")

public Greeting greeting(@RequestParam(value="name", defaultValue="World") String name) {

return new Greeting(counter.incrementAndGet(),

String.format(template, name));

}

}

This controller is concise and simple, but there’s plenty going on under the hood. Let’s break it down step by step.

The @RequestMapping annotation ensures that HTTP requests to /greeting are mapped to the greeting() method.

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| --- | --- |
|  | The above example does not specify GET vs. PUT, POST, and so forth, because @RequestMapping maps all HTTP operations by default. Use @RequestMapping(method=GET) to narrow this mapping. |

@RequestParam binds the value of the query string parameter name into the name parameter of the greeting() method. This query string parameter is explicitly marked as optional (required=true by default): if it is absent in the request, the defaultValue of "World" is used.

The implementation of the method body creates and returns a new Greeting object with idand content attributes based on the next value from the counter, and formats the given name by using the greeting template.

A key difference between a traditional MVC controller and the RESTful web service controller above is the way that the HTTP response body is created. Rather than relying on a [view technology](https://spring.io/understanding/view-templates) to perform server-side rendering of the greeting data to HTML, this RESTful web service controller simply populates and returns a Greeting object. The object data will be written directly to the HTTP response as JSON.

This code uses Spring 4’s new [@RestController](http://docs.spring.io/spring/docs/current/javadoc-api/org/springframework/web/bind/annotation/RestController.html) annotation, which marks the class as a controller where every method returns a domain object instead of a view. It’s shorthand for @Controller and @ResponseBody rolled together.

The Greeting object must be converted to JSON. Thanks to Spring’s HTTP message converter support, you don’t need to do this conversion manually. Because [Jackson 2](http://wiki.fasterxml.com/JacksonHome) is on the classpath, Spring’s [MappingJackson2HttpMessageConverter](http://docs.spring.io/spring/docs/current/javadoc-api/org/springframework/http/converter/json/MappingJackson2HttpMessageConverter.html) is automatically chosen to convert the Greeting instance to JSON.

## Make the application executable

Although it is possible to package this service as a traditional [WAR](https://spring.io/understanding/WAR) file for deployment to an external application server, the simpler approach demonstrated below creates a standalone application. You package everything in a single, executable JAR file, driven by a good old Java main() method. Along the way, you use Spring’s support for embedding the [Tomcat](https://spring.io/understanding/Tomcat) servlet container as the HTTP runtime, instead of deploying to an external instance.

src/main/java/hello/Application.java

package hello;

import org.springframework.boot.SpringApplication;

import org.springframework.boot.autoconfigure.SpringBootApplication;

@SpringBootApplication

public class Application {

public static void main(String[] args) {

SpringApplication.run(Application.class, args);

}

}

@SpringBootApplication is a convenience annotation that adds all of the following:

* @Configuration tags the class as a source of bean definitions for the application context.
* @EnableAutoConfiguration tells Spring Boot to start adding beans based on classpath settings, other beans, and various property settings.
* Normally you would add @EnableWebMvc for a Spring MVC app, but Spring Boot adds it automatically when it sees **spring-webmvc** on the classpath. This flags the application as a web application and activates key behaviors such as setting up a DispatcherServlet.
* @ComponentScan tells Spring to look for other components, configurations, and services in the hello package, allowing it to find the controllers.

The main() method uses Spring Boot’s SpringApplication.run() method to launch an application. Did you notice that there wasn’t a single line of XML? No **web.xml** file either. This web application is 100% pure Java and you didn’t have to deal with configuring any plumbing or infrastructure.

### Build an executable JAR

You can run the application from the command line with Gradle or Maven. Or you can build a single executable JAR file that contains all the necessary dependencies, classes, and resources, and run that. This makes it easy to ship, version, and deploy the service as an application throughout the development lifecycle, across different environments, and so forth.

If you are using Gradle, you can run the application using ./gradlew bootRun. Or you can build the JAR file using ./gradlew build. Then you can run the JAR file:

java -jar build/libs/gs-rest-service-0.1.0.jar

If you are using Maven, you can run the application using ./mvnw spring-boot:run. Or you can build the JAR file with ./mvnw clean package. Then you can run the JAR file:

java -jar target/gs-rest-service-0.1.0.jar

|  |  |
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|  | The procedure above will create a runnable JAR. You can also opt to [build a classic WAR file](https://spring.io/guides/gs/convert-jar-to-war/) instead. |

Logging output is displayed. The service should be up and running within a few seconds.

## Test the service

Now that the service is up, visit <http://localhost:8080/greeting>, where you see:

{"id":1,"content":"Hello, World!"}

Provide a name query string parameter with <http://localhost:8080/greeting?name=User>. Notice how the value of the content attribute changes from "Hello, World!" to "Hello User!":

{"id":2,"content":"Hello, User!"}

This change demonstrates that the @RequestParam arrangement in GreetingController is working as expected. The name parameter has been given a default value of "World", but can always be explicitly overridden through the query string.

Notice also how the id attribute has changed from 1 to 2. This proves that you are working against the same GreetingController instance across multiple requests, and that its counter field is being incremented on each call as expected.

## Summary

Congratulations! You’ve just developed a RESTful web service with Spring.

Want to write a new guide or contribute to an existing one? Check out our [contribution guidelines](https://github.com/spring-guides/getting-started-guides/wiki).

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