

Getting started with Spring Boot

Pre-Training for Cloud Native Workshop

Toshiaki Maki
Feb 8 2016

Contents

- HelloWorld (1.5h)
- Web (1h)
- DataAccess (1.5h)
- Actuator (0.5h)

Source Code

<https://github.com/Pivotal-Japan/getting-started-with-spring-boot>

Pivotal-Japan / **getting-started-with-spring-boot** Unwatch

<> Code Issues 0 Pull requests 0 Wiki Pulse Graphs Settings

Hands on contents for Spring Boot — Edit

1 commit 16 branches

Branch: 01-01 New pull request New file Find file HTTPS https://github.com

making Initial

demo	Initial
.gitignore	Initial

Help people interested in this repository understand your project by adding a README.

Branch: 01-01 New pull request

Switch branches/tags

Find or create a branch...

Branches Tags

- ✓ 01-01
- 01-02
- 01-03
- 01-04
- 01-05
- 01-06
- 01-07
- 01-08
- 02-01
- 02-02
- 02-03
- 03-01

Spring Framework

Spring is a Java framework for enterprise applications, supports

- dependency injection
- transaction management
- web applications
- data access
- messaging
- testing and more.

Spring Boot

Spring Boot makes it easy to create stand-alone, production-grade Spring based Applications that you can "just run".

Spring Boot

- Create stand-alone Spring applications
- Embed Tomcat, Jetty or Undertow directly
- Provide opinionated 'starter' POMs to simplify your Maven configuration
- Automatically configure Spring whenever possible
- Provide production-ready features such as metrics, health checks and externalized configuration
- Absolutely no code generation and no requirement for XML configuration

Hello World

<https://start.spring.io>

The screenshot shows the Spring Initializr web application in a browser window. The browser's address bar displays `https://start.spring.io`. The page has a dark header with the text "SPRING INITIALIZR bootstrap your application now". Below the header, there is a form to generate a project. At the top of the form, it says "Generate a Maven Project with Spring Boot 1.3.2". The form is divided into two main sections: "Project Metadata" and "Dependencies".

Project Metadata

Artifact coordinates

Group

Artifact

Dependencies

Add Spring Boot Starters and dependencies to your application

Search for dependencies

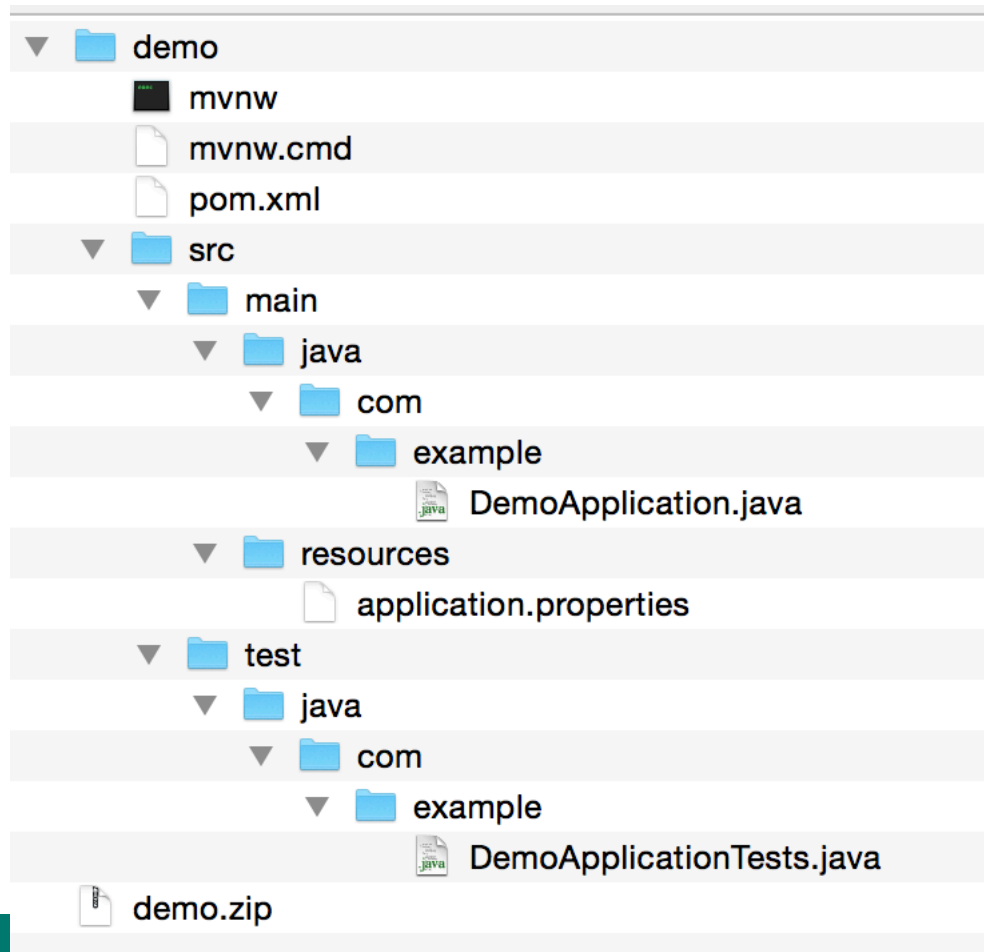
Selected Starters

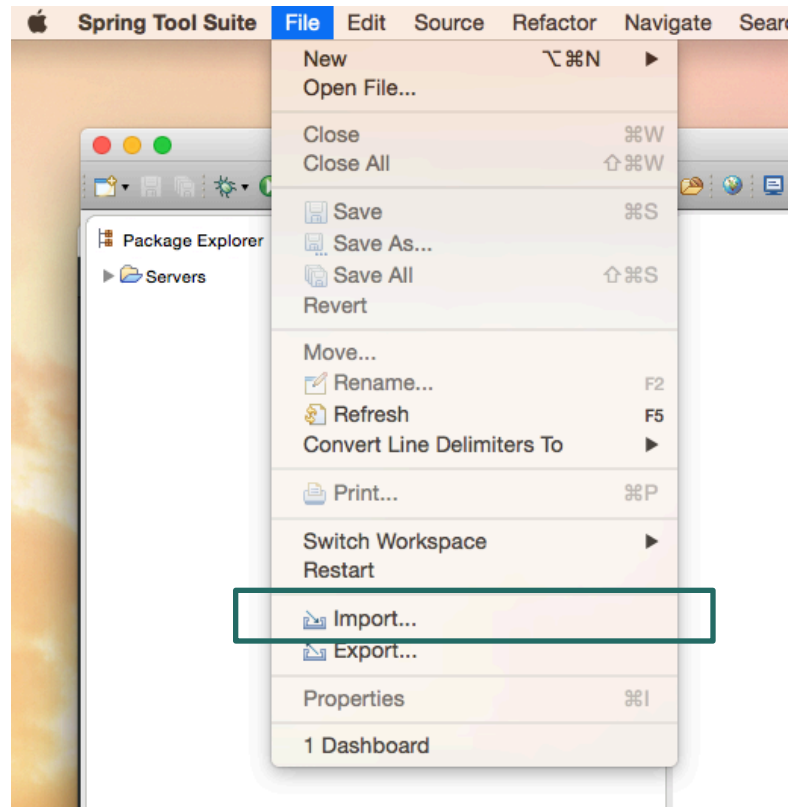
[Generate Project](#)

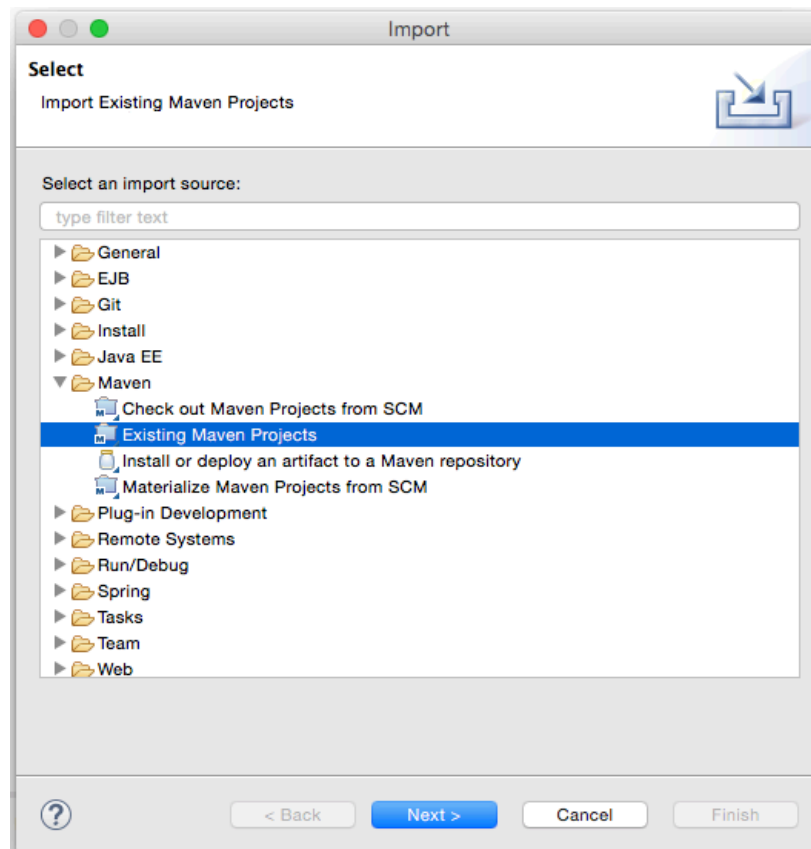
Don't know what to look for? Want more options? [Switch to the full version.](#)

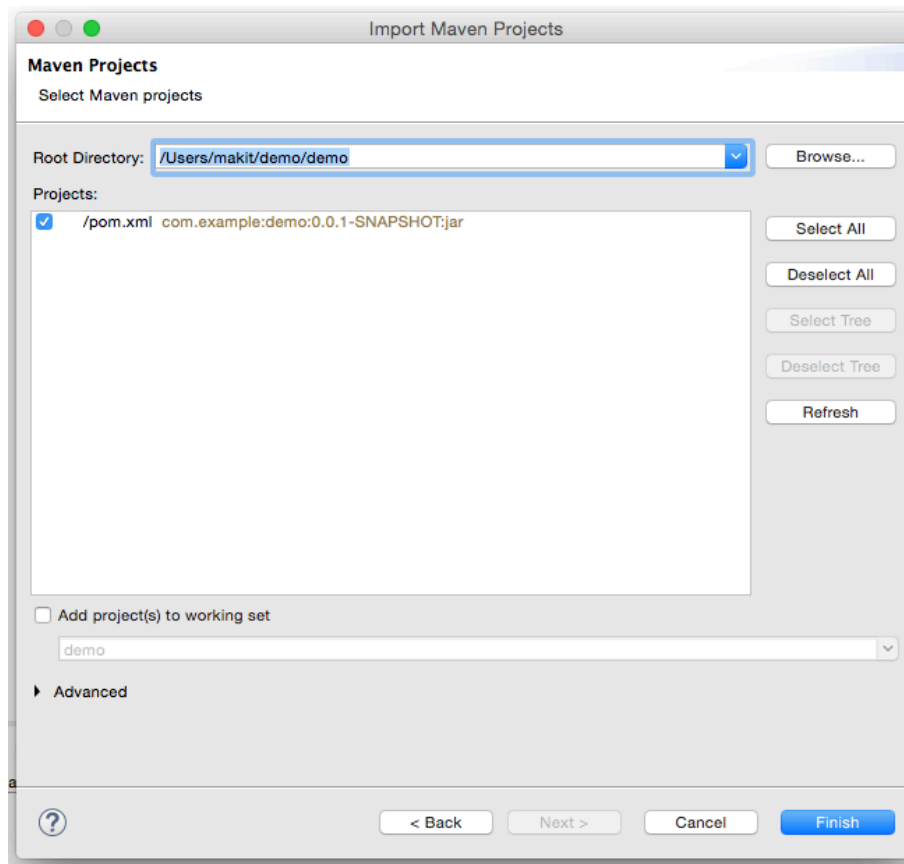
start.spring.io is powered by [Spring Initializr](#) and [Pivotal Web Services](#)

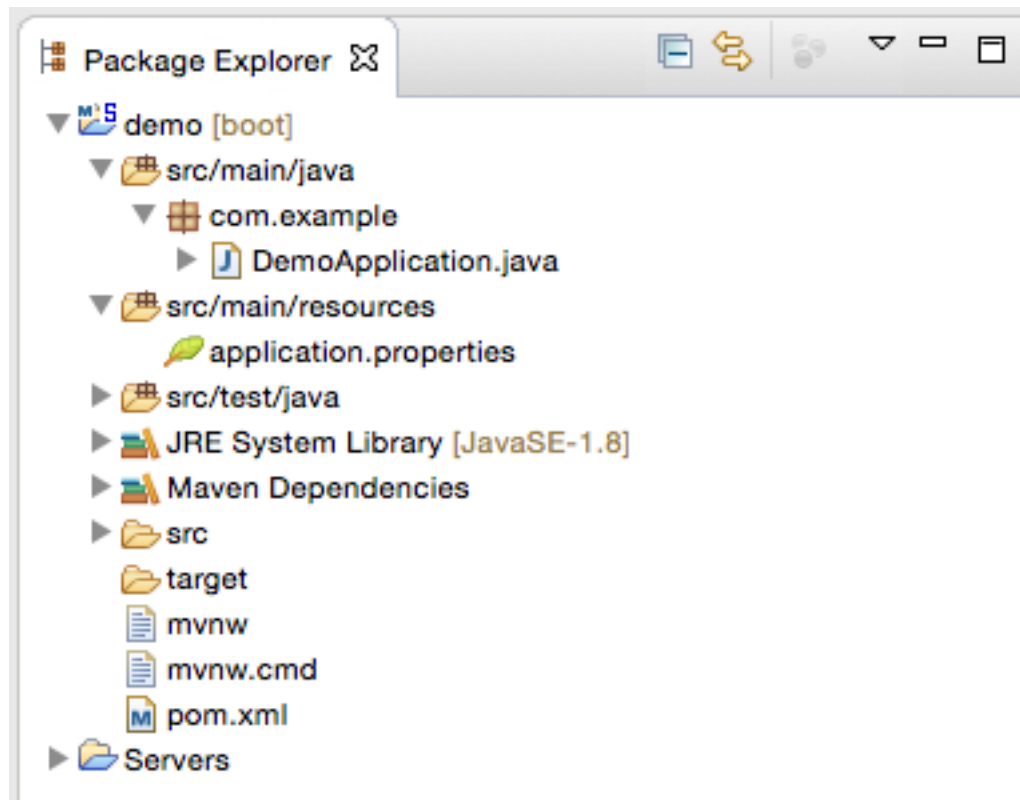
A large teal arrow points from the right towards the "Generate Project" button, with the word "Click" written inside it.





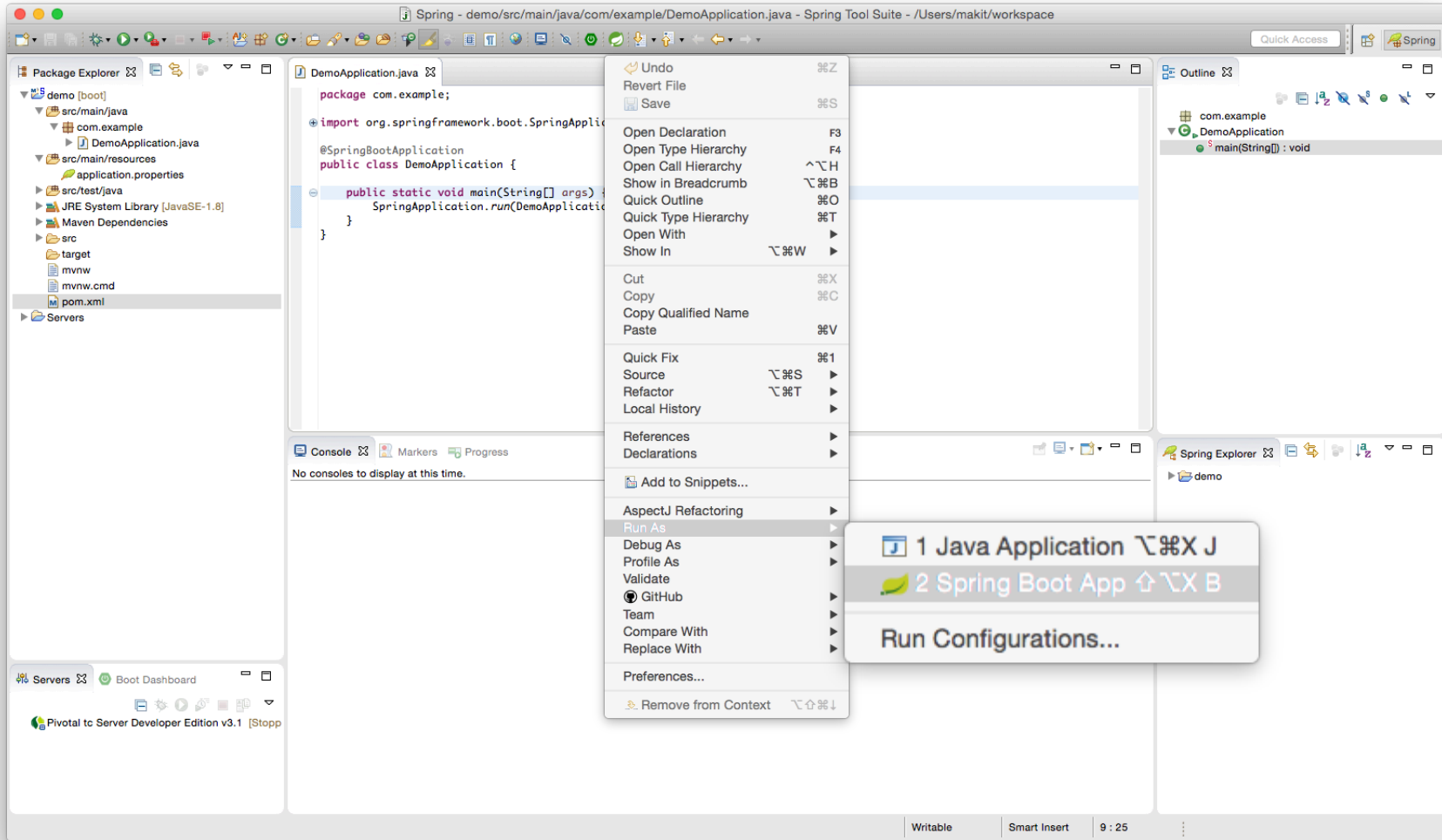






Boilerplate entry point

```
@SpringBootApplication
public class DemoApplication {
    public static void main(String[] args) {
        SpringApplication.run(DemoApplication.class, args);
    }
}
```



Output (01-01)

[illegible]

```

2016-02-02 17:10:31.936 INFO 31599 --- [           main] com.example.DemoApplication      : Starting DemoApplication on jpxxmakitm1.corp.emc.com with PID
31599 (/Users/makit/demo/demo/target/classes started by makit in /Users/makit/demo/demo)
2016-02-02 17:10:31.938 INFO 31599 --- [           main] com.example.DemoApplication      : No active profile set, falling back to default profiles:
default
2016-02-02 17:10:31.977 INFO 31599 --- [           main] s.c.a.AnnotationConfigApplicationContext : Refreshing
org.springframework.context.annotation.AnnotationConfigApplicationContext@1ee807c6: startup date [Tue Feb 02 17:10:31 JST 2016]; root of context hierarchy
2016-02-02 17:10:32.494 INFO 31599 --- [           main] o.s.j.e.a.AnnotationMBeanExporter : Registering beans for JMX exposure on startup
2016-02-02 17:10:32.506 INFO 31599 --- [           main] com.example.DemoApplication      : Started DemoApplication in 0.744 seconds (JVM running for
1.136)
2016-02-02 17:10:32.507 INFO 31599 --- [Thread-1] s.c.a.AnnotationConfigApplicationContext : Closing
org.springframework.context.annotation.AnnotationConfigApplicationContext@1ee807c6: startup date [Tue Feb 02 17:10:31 JST 2016]; root of context hierarchy
2016-02-02 17:10:32.509 INFO 31599 --- [Thread-1] o.s.j.e.a.AnnotationMBeanExporter : Unregistering JMX-exposed beans on shutdown

```


Use CommandLineRunner

```
@SpringBootApplication
public class DemoApplication implements CommandLineRunner {
    public static void main(String[] args) {
        SpringApplication.run(DemoApplication.class, args);
    }
    @Override
    public void run(String... args) throws Exception {
        System.out.println("Hello World!");
    }
}
```

Output (01-02)

```
./¥¥ /_-' ( ) _-¥¥¥¥¥
( ( )¥ | ' _ | ' _ ¥/ _ | ¥¥¥¥¥
¥¥/ _ ) | | | | | | | ( | ) ) )
' | _ | . _ | | | | | ¥ _ | / / / /
=====|_|=====|_|/_/_/_/_/
:: Spring Boot :: (v1.3.2.RELEASE)
```

```
2016-02-02 17:37:50.505 INFO 31654 --- [main] com.example.DemoApplication : Starting DemoApplication on jpxxmakitm1.corp.emc.com with PID
31654 (/Users/makit/demo/demo/target/classes started by makit in /Users/makit/demo/demo)
2016-02-02 17:37:50.507 INFO 31654 --- [main] com.example.DemoApplication : No active profile set, falling back to default profiles:
default
2016-02-02 17:37:50.544 INFO 31654 --- [main] s.c.a.AnnotationConfigApplicationContext : Refreshing
org.springframework.context.annotation.AnnotationConfigApplicationContext@517cd4b: startup date [Tue Feb 02 17:37:50 JST 2016]; root of context hierarchy
2016-02-02 17:37:51.052 INFO 31654 --- [main] o.s.j.e.a.AnnotationMBeanExporter : Registering beans for JMX exposure on startup
```

Hello World!

```
2016-02-02 17:37:51.063 INFO 31654 --- [main] com.example.DemoApplication : Started DemoApplication in 0.725 seconds (JVM running for
1.137)
2016-02-02 17:37:51.064 INFO 31654 --- [Thread-1] s.c.a.AnnotationConfigApplicationContext : Closing
org.springframework.context.annotation.AnnotationConfigApplicationContext@517cd4b: startup date [Tue Feb 02 17:37:50 JST 2016]; root of context hierarchy
2016-02-02 17:37:51.066 INFO 31654 --- [Thread-1] o.s.j.e.a.AnnotationMBeanExporter : Unregistering JMX-exposed beans on shutdown
```

Make a first component

```
package com.example;  
  
public interface GreetingService {  
    String greet();  
}
```

Implement GreetingService

```
package com.example;

public class SimpleGreetingService
    implements GreetingService {
    @Override
    public String greet() {
        return "Hello World!";
    }
}
```

Define a Bean

```
@SpringBootApplication
public class DemoApplication implements CommandLineRunner {

    @Bean
    GreetingService greetingService() {
        return new SimpleGreetingService();
    }

    public static void main(String[] args) { /* omit */ }

    @Override
    public void run(String... args) throws Exception { /* omit */ }
}
```

Inject GreetingService & use this

@SpringBootApplication

```
public class DemoApplication implements CommandLineRunner {
```

```
    @Bean GreetingService greetingService() { /* ommit */ }
```

@Autowired

```
GreetingService greetingService;
```

```
public static void main(String[] args) { /* ommit */ }
```

@Override

```
public void run(String... args) throws Exception {
```

```
    System.out.println(greetingService.greet());
```

```
}
```

```
}
```

Output (01-03)

[illegible]

```

2016-02-02 18:07:34.626 INFO 31879 --- [           main] com.example.DemoApplication      : Starting DemoApplication on jpxxmakitm1.corp.emc.com with PID
31879 (/Users/makit/demo/demo/target/classes started by makit in /Users/makit/demo/demo)
2016-02-02 18:07:34.628 INFO 31879 --- [           main] com.example.DemoApplication      : No active profile set, falling back to default profiles:
default
2016-02-02 18:07:34.665 INFO 31879 --- [           main] s.c.a.AnnotationConfigApplicationContext : Refreshing
org.springframework.context.annotation.AnnotationConfigApplicationContext@517cd4b: startup date [Tue Feb 02 18:07:34 JST 2016]; root of context hierarchy
2016-02-02 18:07:35.181 INFO 31879 --- [           main] o.s.j.e.a.AnnotationMBeanExporter : Registering beans for JMX exposure on startup
Hello World!
2016-02-02 18:07:35.196 INFO 31879 --- [           main] com.example.DemoApplication      : Started DemoApplication in 0.736 seconds (JVM running for
1.579)
2016-02-02 18:07:35.198 INFO 31879 --- [Thread-1] s.c.a.AnnotationConfigApplicationContext : Closing
org.springframework.context.annotation.AnnotationConfigApplicationContext@517cd4b: startup date [Tue Feb 02 18:07:34 JST 2016]; root of context hierarchy
2016-02-02 18:07:35.200 INFO 31879 --- [Thread-1] o.s.j.e.a.AnnotationMBeanExporter : Unregistering JMX-exposed beans on shutdown

```

Annotate with @Component

@Component

```
public class SimpleGreetingService
    implements GreetingService {

    @Override
    public String greet() {
        return "Hello World!";
    }
}
```


Remove the Bean definition

@SpringBootApplication

```
public class DemoApplication implements CommandLineRunner {
```

```
@Bean GreetingService greetingService() {/* ommit */}
```

@Autowired

```
GreetingService greetingService;
```

```
public static void main(String[] args) {/* ommit */}
```

@Override

```
public void run(String... args) throws Exception {
```

```
    System.out.println(greetingService.greet());
```

```
}
```

```
}
```

Remove the Bean definition

```
@SpringBootApplication
```

```
public class DemoApplication implements CommandLineRunner {
```

```
    @Autowired
```

```
    GreetingService greetingService;
```

```
    public static void main(String[] args) { /* ommit */ }
```

```
    @Override
```

```
    public void run(String... args) throws Exception {
```

```
        System.out.println(greetingService.greet());
```

```
    }
```

```
}
```

Output (01-04)

[illegible]

```

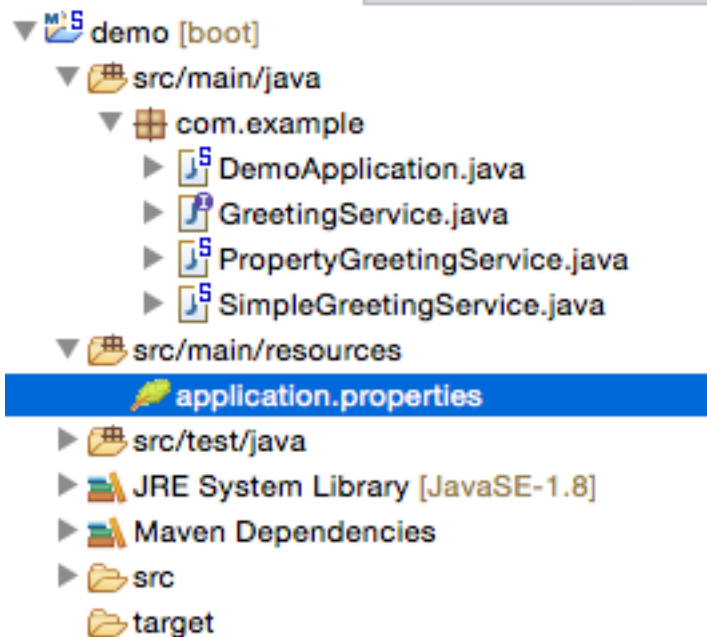
2016-02-02 18:16:00.132 INFO 32066 --- [           main] com.example.DemoApplication      : Starting DemoApplication on jpxxmakitm1.corp.emc.com with PID
32066 (/Users/makit/demo/demo/target/classes started by makit in /Users/makit/demo/demo)
2016-02-02 18:16:00.134 INFO 32066 --- [           main] com.example.DemoApplication      : No active profile set, falling back to default profiles:
default
2016-02-02 18:16:00.171 INFO 32066 --- [           main] s.c.a.AnnotationConfigApplicationContext : Refreshing
org.springframework.context.annotation.AnnotationConfigApplicationContext@517cd4b: startup date [Tue Feb 02 18:16:00 JST 2016]; root of context hierarchy
2016-02-02 18:16:00.681 INFO 32066 --- [           main] o.s.j.e.a.AnnotationMBeanExporter : Registering beans for JMX exposure on startup
Hello World!
2016-02-02 18:16:00.693 INFO 32066 --- [           main] com.example.DemoApplication      : Started DemoApplication in 0.739 seconds (JVM running for
1.139)
2016-02-02 18:16:00.694 INFO 32066 --- [Thread-1] s.c.a.AnnotationConfigApplicationContext : Closing
org.springframework.context.annotation.AnnotationConfigApplicationContext@517cd4b: startup date [Tue Feb 02 18:16:00 JST 2016]; root of context hierarchy
2016-02-02 18:16:00.696 INFO 32066 --- [Thread-1] o.s.j.e.a.AnnotationMBeanExporter : Unregistering JMX-exposed beans on shutdown

```

Make another GreetingService

```
@Component
public class PropertyGreetingService
        implements GreetingService {
    @Value("${greeting.message}")
    String message;
    @Override
    public String greet() {
        return message;
    }
}
```

Configure the property



Make another GreetingService

```
greeting.message=Hello New World!
```

Remove @Component from Simple

```
@Component  
public class SimpleGreetingService  
        implements GreetingService {  
    @Override  
    public String greet() {  
        return "Hello World!";  
    }  
}
```

Remove @Component from Simple

```
public class SimpleGreetingService
    implements GreetingService {
    @Override
    public String greet() {
        return "Hello World!";
    }
}
```


Output (01-05)

```
./¥¥ /_-' ( ) _-¥¥¥¥¥
( ( )¥ | ' _ | ' _ ¥/ _ | ¥¥¥¥¥
¥¥/ _ ) | | | | | | | ( | ) ) )
' | _ | . _ | | | | | ¥ _ | / / / /
=====|_|=====|_|/_/_/_/_/
:: Spring Boot :: (v1.3.2.RELEASE)
```

```
2016-02-02 18:31:48.618 INFO 32150 --- [main] com.example.DemoApplication : Starting DemoApplication on jpxxmakitm1.corp.emc.com with PID
32150 (/Users/makit/demo/demo/target/classes started by makit in /Users/makit/demo/demo)
2016-02-02 18:31:48.621 INFO 32150 --- [main] com.example.DemoApplication : No active profile set, falling back to default profiles:
default
2016-02-02 18:31:48.657 INFO 32150 --- [main] s.c.a.AnnotationConfigApplicationContext : Refreshing
org.springframework.context.annotation.AnnotationConfigApplicationContext@517cd4b: startup date [Tue Feb 02 18:31:48 JST 2016]; root of context hierarchy
2016-02-02 18:31:49.183 INFO 32150 --- [main] o.s.j.e.a.AnnotationMBeanExporter : Registering beans for JMX exposure on startup
```

Hello New World!

```
2016-02-02 18:31:49.195 INFO 32150 --- [main] com.example.DemoApplication : Started DemoApplication in 0.763 seconds (JVM running for
1.175)
2016-02-02 18:31:49.196 INFO 32150 --- [Thread-1] s.c.a.AnnotationConfigApplicationContext : Closing
org.springframework.context.annotation.AnnotationConfigApplicationContext@517cd4b: startup date [Tue Feb 02 18:31:48 JST 2016]; root of context hierarchy
2016-02-02 18:31:49.198 INFO 32150 --- [Thread-1] o.s.j.e.a.AnnotationMBeanExporter : Unregistering JMX-exposed beans on shutdown
```

What happen unless remove

```
@Component // <----  
public class SimpleGreetingService  
            implements GreetingService {  
    @Override  
    public String greet() {  
        return "Hello World!";  
    }  
}
```

Output

com.example.DemoApplication.greetingService; nested exception is org.springframework.beans.factory.NoUniqueBeanDefinitionException: **No qualifying bean of type [com.example.GreetingService] is defined: expected single matching bean but found 2:**
propertyGreetingService,simpleGreetingService

```
at
org.springframework.beans.factory.annotation.AutowiredAnnotationBeanPostProcessor$AutowiredFieldElement.inject(AutowiredAnnotationBeanPostProcessor.java:573)
~[spring-beans-4.2.4.RELEASE.jar:4.2.4.RELEASE]
at org.springframework.beans.factory.annotation.InjectionMetadata.inject(InjectionMetadata.java:88) ~[spring-beans-
4.2.4.RELEASE.jar:4.2.4.RELEASE]
at
org.springframework.beans.factory.annotation.AutowiredAnnotationBeanPostProcessor.postProcessPropertyValues(AutowiredAnnotationBeanPostProcessor.java:331)
~[spring-beans-4.2.4.RELEASE.jar:4.2.4.RELEASE]
... 16 common frames omitted
Caused by: org.springframework.beans.factory.NoUniqueBeanDefinitionException: No qualifying bean of type [com.example.GreetingService] is defined: expected single
matching bean but found 2: propertyGreetingService,simpleGreetingService
at org.springframework.beans.factory.support.DefaultListableBeanFactory.doResolveDependency(DefaultListableBeanFactory.java:1126) ~[spring-beans-
4.2.4.RELEASE.jar:4.2.4.RELEASE]
at org.springframework.beans.factory.support.DefaultListableBeanFactory.resolveDependency(DefaultListableBeanFactory.java:1014) ~[spring-beans-
4.2.4.RELEASE.jar:4.2.4.RELEASE]
at
org.springframework.beans.factory.annotation.AutowiredAnnotationBeanPostProcessor$AutowiredFieldElement.inject(AutowiredAnnotationBeanPostProcessor.java:545)
~[spring-beans-4.2.4.RELEASE.jar:4.2.4.RELEASE]
... 18 common frames omitted
```

Solutions

1. Specify the Bean name explicitly with `@Qualifier` + `@Autowired`
2. Remove `@Component` from both and specify the concrete bean with `@Bean`
3. Annotate `@Primary` on preferred one

Solution 1

```
@SpringBootApplication
public class DemoApplication implements CommandLineRunner {

    @Autowired
    @Qualifier("propertyGreetingService") // or simpleGreeting...
    GreetingService greetingService;

    public static void main(String[] args) { /* ommit */ }

    @Override
    public void run(String... args) throws Exception {
        System.out.println(greetingService.greet());
    }
}
```

Output (01-06)

```
.
/¥¥ / _ ,      ( )      ¥ ¥ ¥ ¥
( ( )¥ _ | ' _ | ' _ | ' _ | ¥ / _ | ¥ ¥ ¥ ¥
¥¥/ _ | _ | _ | _ | _ | _ | _ | _ | ) ) ) )
' _ | _ | _ | _ | _ | _ | _ | _ | / / / /
=====|_|=====|_|/_/_/_/_/
:: Spring Boot ::      (v1.3.2.RELEASE)
```

```
2016-02-02 18:47:47.412 INFO 32172 --- [main] com.example.DemoApplication : Starting DemoApplication on jpxxmakitm1.corp.emc.com with PID
32172 (/Users/makit/demo/demo/target/classes started by makit in /Users/makit/demo/demo)
2016-02-02 18:47:47.414 INFO 32172 --- [main] com.example.DemoApplication : No active profile set, falling back to default profiles:
default
2016-02-02 18:47:47.450 INFO 32172 --- [main] s.c.a.AnnotationConfigApplicationContext : Refreshing
org.springframework.context.annotation.AnnotationConfigApplicationContext@517cd4b: startup date [Tue Feb 02 18:47:47 JST 2016]; root of context hierarchy
2016-02-02 18:47:48.036 INFO 32172 --- [main] o.s.j.e.a.AnnotationMBeanExporter : Registering beans for JMX exposure on startup
Hello New World!
2016-02-02 18:47:48.054 INFO 32172 --- [main] com.example.DemoApplication : Started DemoApplication in 0.815 seconds (JVM running for
1.23)
2016-02-02 18:47:48.055 INFO 32172 --- [Thread-1] s.c.a.AnnotationConfigApplicationContext : Closing
org.springframework.context.annotation.AnnotationConfigApplicationContext@517cd4b: startup date [Tue Feb 02 18:47:47 JST 2016]; root of context hierarchy
2016-02-02 18:47:48.057 INFO 32172 --- [Thread-1] o.s.j.e.a.AnnotationMBeanExporter : Unregistering JMX-exposed beans on shutdown
```

Solution 2

```
@SpringBootApplication
public class DemoApplication implements CommandLineRunner {

    @Bean // remove @Component from both GreetingService
    GreetingService greetingService() {
        return new PropertyGreetingService();
    }

    public static void main(String[] args) { /* omit */ }

    @Override
    public void run(String... args) throws Exception { /* omit */ }
}
```

Output (01-07)

```
.
/¥¥ / _ ,      ( )      ¥ ¥ ¥ ¥
( ( )¥ _ | ' _ | ' _ | ' _ | ¥ / _ | ¥ ¥ ¥ ¥
¥¥/ _ | _ | _ | _ | _ | _ | _ | _ | ) ) ) )
' _ | _ | _ | _ | _ | _ | _ | _ | / / / /
=====|_|=====|_|/_/_/_/_/
:: Spring Boot ::      (v1.3.2.RELEASE)
```

```
2016-02-02 18:47:47.412 INFO 32172 --- [main] com.example.DemoApplication : Starting DemoApplication on jpxxmakitm1.corp.emc.com with PID
32172 (/Users/makit/demo/demo/target/classes started by makit in /Users/makit/demo/demo)
2016-02-02 18:47:47.414 INFO 32172 --- [main] com.example.DemoApplication : No active profile set, falling back to default profiles:
default
2016-02-02 18:47:47.450 INFO 32172 --- [main] s.c.a.AnnotationConfigApplicationContext : Refreshing
org.springframework.context.annotation.AnnotationConfigApplicationContext@517cd4b: startup date [Tue Feb 02 18:47:47 JST 2016]; root of context hierarchy
2016-02-02 18:47:48.036 INFO 32172 --- [main] o.s.j.e.a.AnnotationMBeanExporter : Registering beans for JMX exposure on startup
Hello New World!
2016-02-02 18:47:48.054 INFO 32172 --- [main] com.example.DemoApplication : Started DemoApplication in 0.815 seconds (JVM running for
1.23)
2016-02-02 18:47:48.055 INFO 32172 --- [Thread-1] s.c.a.AnnotationConfigApplicationContext : Closing
org.springframework.context.annotation.AnnotationConfigApplicationContext@517cd4b: startup date [Tue Feb 02 18:47:47 JST 2016]; root of context hierarchy
2016-02-02 18:47:48.057 INFO 32172 --- [Thread-1] o.s.j.e.a.AnnotationMBeanExporter : Unregistering JMX-exposed beans on shutdown
```


Solution 3

```
@Component
@Primary
public class PropertyGreetingService
        implements GreetingService {
    @Value("${greeting.message}")
    String message;
    @Override
    public String greet() {
        return message;
    }
}
```

Output (01-08)

```
.
/¥¥ / _ ,      ( )      ¥ ¥ ¥ ¥
( ( )¥ _ | ' _ | ' _ | ' _ | ¥ / _ | ¥ ¥ ¥ ¥
¥¥/ _ | _ | _ | _ | _ | _ | _ | _ | ) ) ) )
' _ | _ | _ | _ | _ | _ | _ | _ | / / / /
=====|_|=====|_|/_/_/_/_/
:: Spring Boot ::      (v1.3.2.RELEASE)
```

```
2016-02-02 18:47:47.412 INFO 32172 --- [main] com.example.DemoApplication : Starting DemoApplication on jpxxmakitm1.corp.emc.com with PID
32172 (/Users/makit/demo/demo/target/classes started by makit in /Users/makit/demo/demo)
2016-02-02 18:47:47.414 INFO 32172 --- [main] com.example.DemoApplication : No active profile set, falling back to default profiles:
default
2016-02-02 18:47:47.450 INFO 32172 --- [main] s.c.a.AnnotationConfigApplicationContext : Refreshing
org.springframework.context.annotation.AnnotationConfigApplicationContext@517cd4b: startup date [Tue Feb 02 18:47:47 JST 2016]; root of context hierarchy
2016-02-02 18:47:48.036 INFO 32172 --- [main] o.s.j.e.a.AnnotationMBeanExporter : Registering beans for JMX exposure on startup
Hello New World!
2016-02-02 18:47:48.054 INFO 32172 --- [main] com.example.DemoApplication : Started DemoApplication in 0.815 seconds (JVM running for
1.23)
2016-02-02 18:47:48.055 INFO 32172 --- [Thread-1] s.c.a.AnnotationConfigApplicationContext : Closing
org.springframework.context.annotation.AnnotationConfigApplicationContext@517cd4b: startup date [Tue Feb 02 18:47:47 JST 2016]; root of context hierarchy
2016-02-02 18:47:48.057 INFO 32172 --- [Thread-1] o.s.j.e.a.AnnotationMBeanExporter : Unregistering JMX-exposed beans on shutdown
```

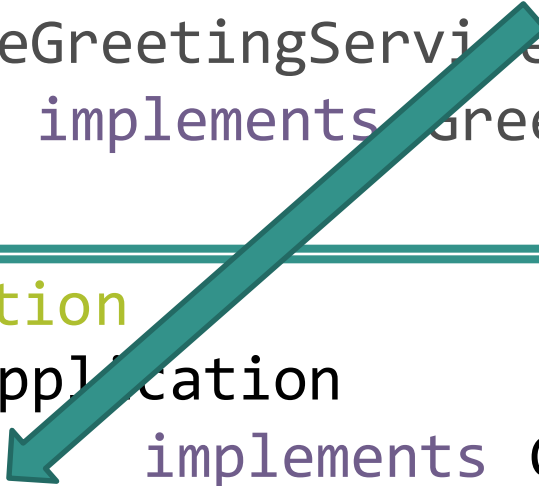
Solution 4

```
@Component
@Vanilla
public class SimpleGreetingService
    implements GreetingService
{
    /* ... */
}
```



```
@SpringBootApplication
public class DemoApplication
    implements CommandLineRunner {

    @Autowired @Vanilla
    GreetingService greetingService;
}
```



Solution 4

```
package com.example;
import org.springframework.beans.factory.annotation.Qualifier;
import java.lang.annotation.*;
@Target({ElementType.FIELD, ElementType.METHOD,
                                                ElementType.TYPE})
@Retention(RetentionPolicy.RUNTIME)
@Inherited
@Documented
@Qualifier
public @interface Vanilla {
}
```

Build the application

```
$ cd demo  
$ mvn clean package -Dmaven.test.skip=true  
$ java -jar target/demo-0.0.1-SNAPSHOT.jar
```

Change the property

```
$ java -jar target/demo-0.0.1-SNAPSHOT.jar --greeting.message=Hi
```

[illegible]

```

2016-02-02 19:09:30.950 INFO 32418 --- [ main] com.example.DemoApplication : Starting DemoApplication v0.0.1-SNAPSHOT on
jpxmakitm1.corp.emc.com with PID 32418 (/Users/makit/demo/demo/target/demo-0.0.1-SNAPSHOT.jar started by makit in /Users/makit/demo/demo)
2016-02-02 19:09:30.953 INFO 32418 --- [ main] com.example.DemoApplication : No active profile set, falling back to default profiles:
default
2016-02-02 19:09:30.998 INFO 32418 --- [ main] s.c.a.AnnotationConfigApplicationContext : Refreshing
org.springframework.context.annotation.AnnotationConfigApplicationContext@7199f18b: startup date [Tue Feb 02 19:09:30 JST 2016]; root of context hierarchy
2016-02-02 19:09:31.628 INFO 32418 --- [ main] o.s.j.e.a.AnnotationMBeanExporter : Registering beans for JMX exposure on startup

```

Hi

```
2016-02-02 19:09:31.641 INFO 32418 --- [main] com.example.DemoApplication : Started DemoApplication in 1.309 seconds (JVM running for 1.683)
2016-02-02 19:09:31.641 INFO 32418 --- [Thread-2] s.c.a.AnnotationConfigApplicationContext : Closing
org.springframework.context.annotation.AnnotationConfigApplicationContext@7199f18b: startup date [Tue Feb 02 19:09:30 JST 2016]; root of context hierarchy
2016-02-02 19:09:31.643 INFO 32418 --- [Thread-2] o.s.j.e.a.AnnotationMBeanExporter : Unregistering JMX-exposed beans on shutdown
```

Web Application

Spring Initializr x Toshiki

← → ↻ 🏠 🔒 https://start.spring.io ⚡ ☆ JB ↺ 🔍 ☰

SPRING INITIALIZR bootstrap your application now

Generate a Maven Project with Spring Boot 1.3.2

Project Metadata

Artifact coordinates

Group

Artifact

[Generate Project](#)

Don't know what to look for? Want more options? [Switch to the full version.](#)

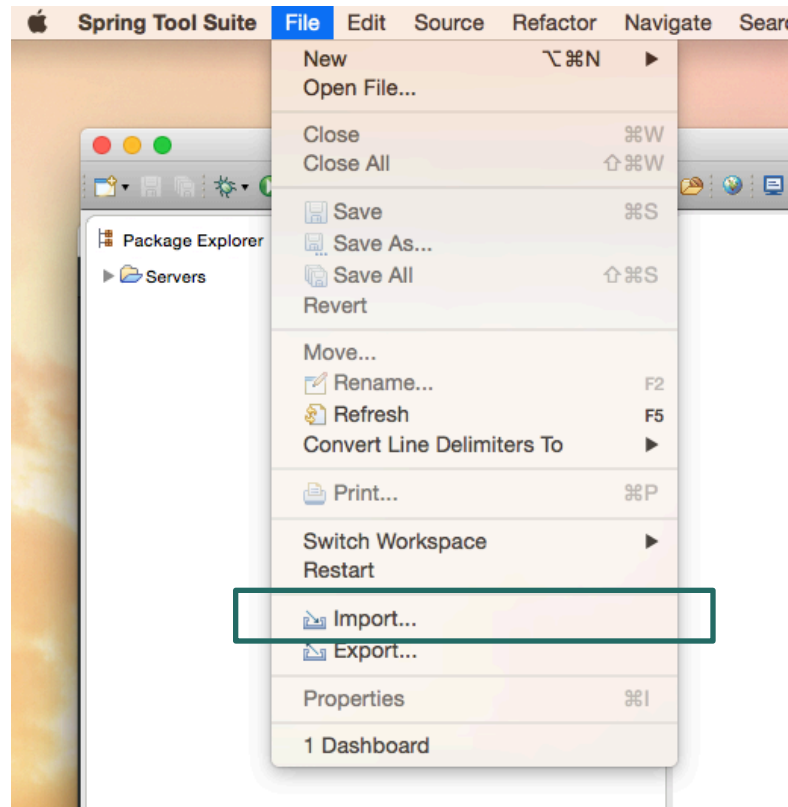
Dependencies

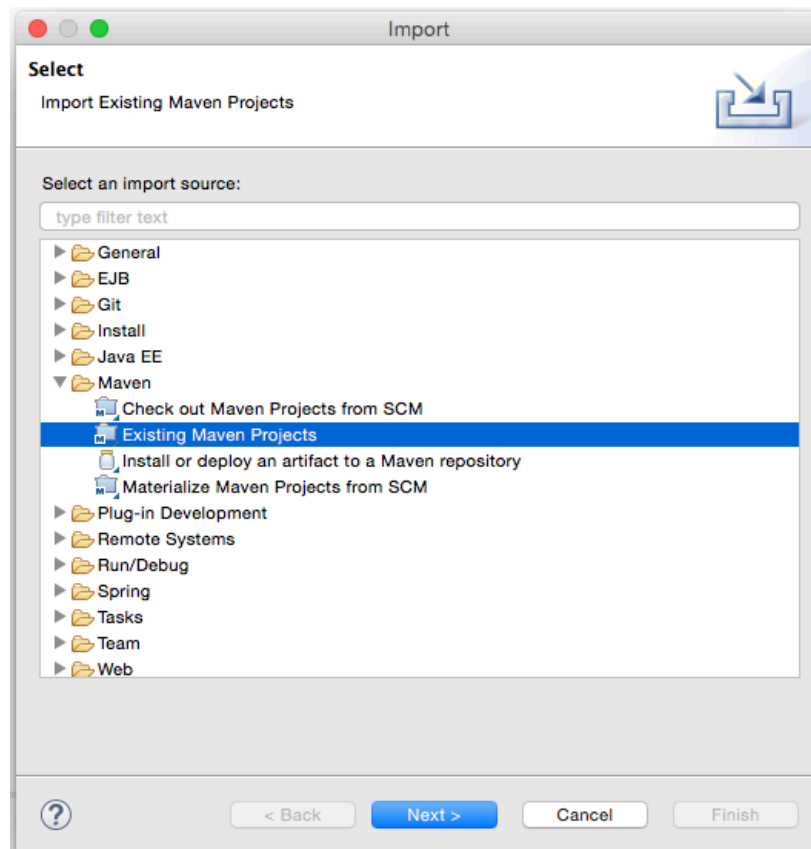
Add Spring Boot Starter dependencies to your application

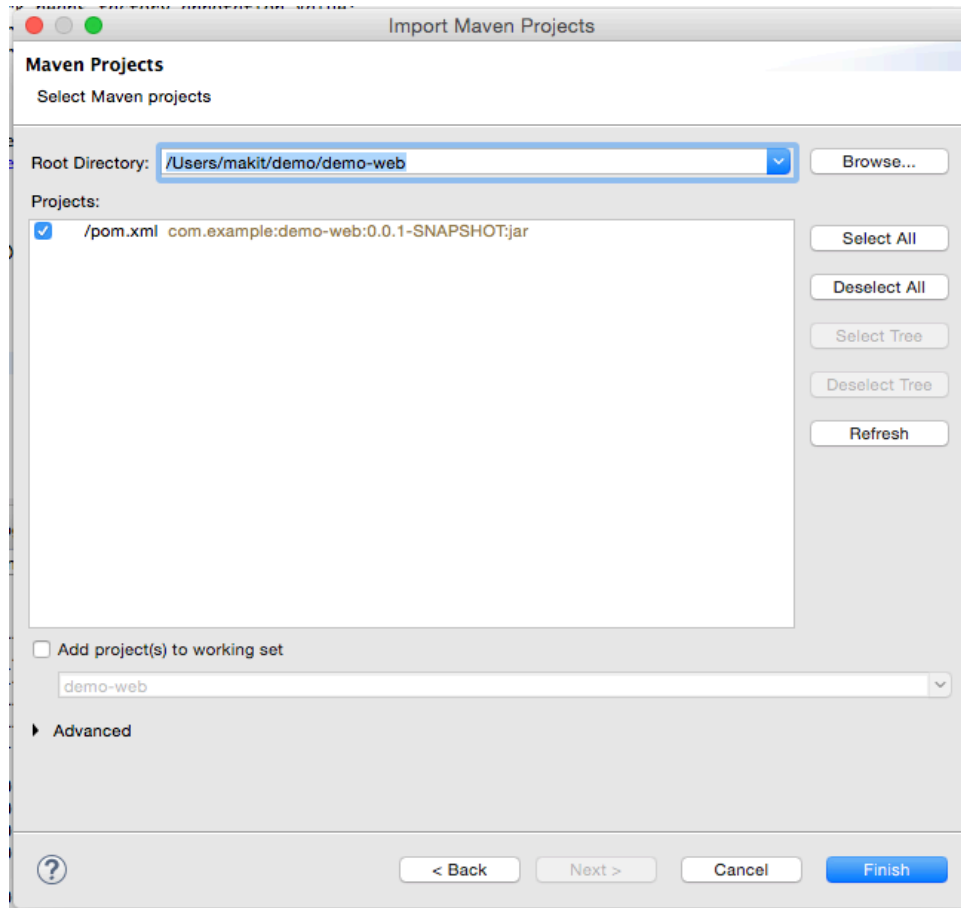
Search for dependencies

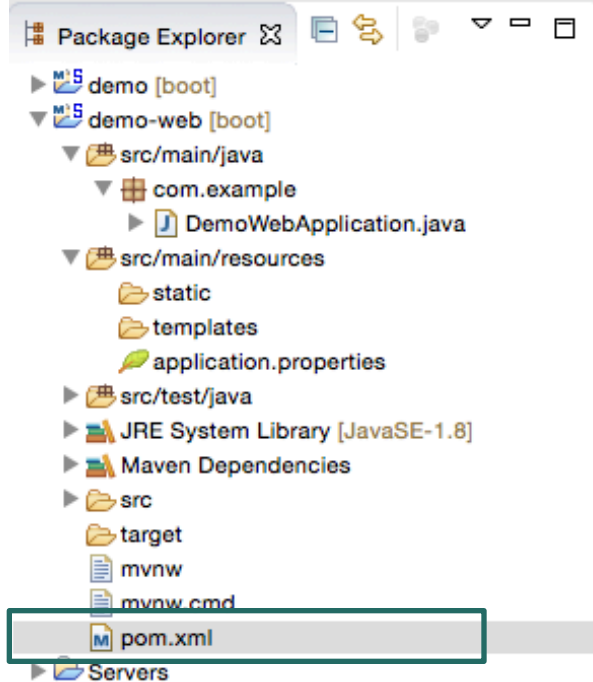
- Web**
Full-stack web development with Tomcat and Spring MVC
- Rest Repositories**
Exposing Spring Data repositories over REST via spring-data-rest-webmvc
- Vaadin**
Vaadin
- WS**
Contract-first SOAP service development with Spring Web Services
- Jersey (JAX-RS)**
the Jersey RESTful Web Services framework

start.spring.io is powered by [Spring Initializr](#) and [Pivotal Web Services](#)









demo-web/pom.xml

Overview

Artifact

Group Id:

Artifact Id:

Version:

Packaging:

Parent

Group Id:

Artifact Id:

Version:

Relative Path:

Properties

Create... Remove

Modules

New module element

Project

Name:

URL:

Description:

Inception:

Organization

SCM

Issue Management

Continuous Integration

Overview Dependencies Dependency Hierarchy Effective POM **pom.xml**

```
<version>1.3.2.RELEASE</version>
<relativePath/> <!-- lookup parent from repository -->
</parent>

<properties>
  <project.build.sourceEncoding>UTF-8</project.build.sourceEncoding>
  <java.version>1.8</java.version>
</properties>

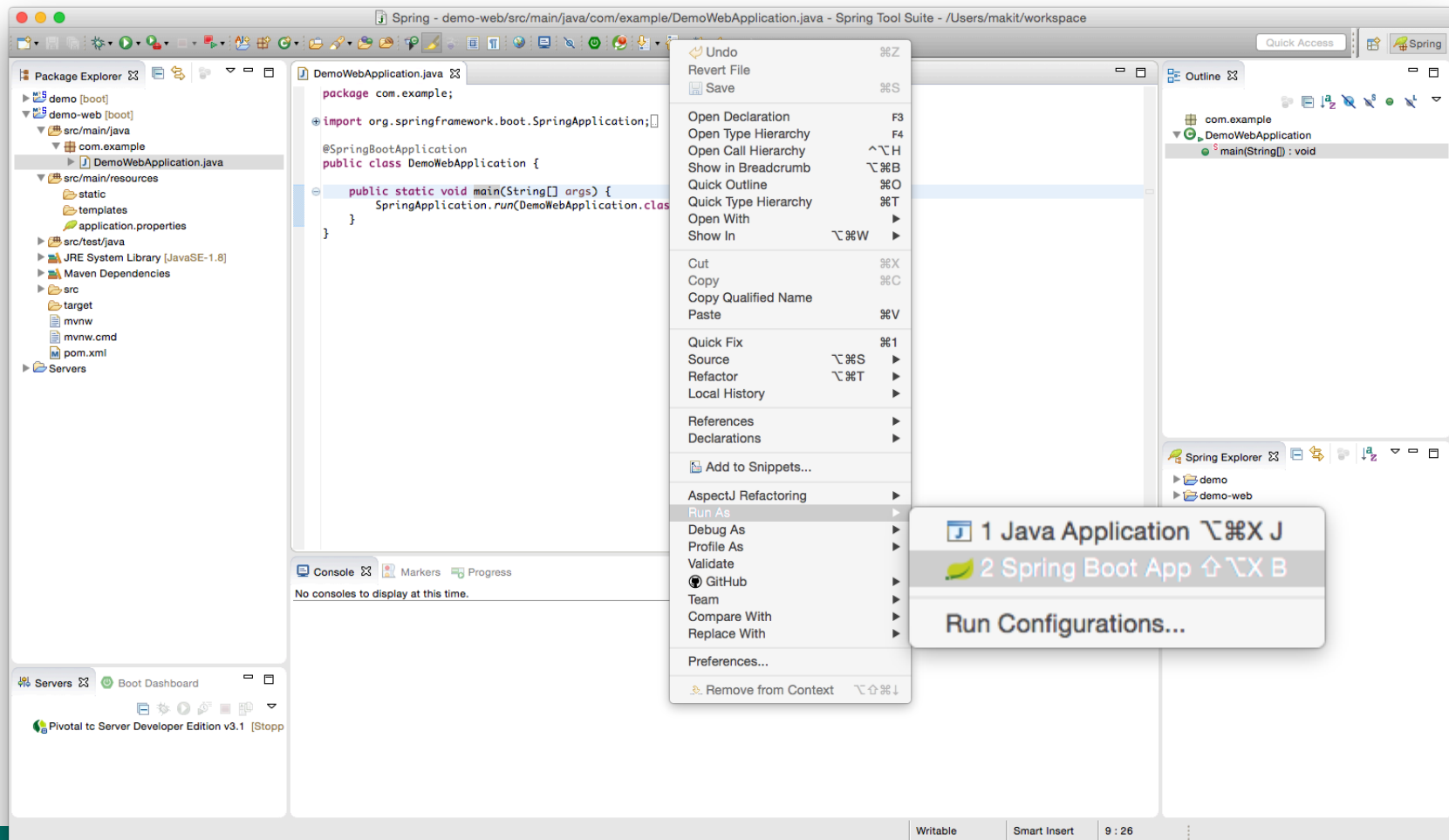
<dependencies>
  <dependency>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-web</artifactId>
  </dependency>

  <dependency>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-test</artifactId>
    <scope>test</scope>
  </dependency>
</dependencies>

<build>
  <plugins>
    <plugin>
      <groupId>org.springframework.boot</groupId>
      <artifactId>spring-boot-maven-plugin</artifactId>
    </plugin>
  </plugins>
</build>
```



Added

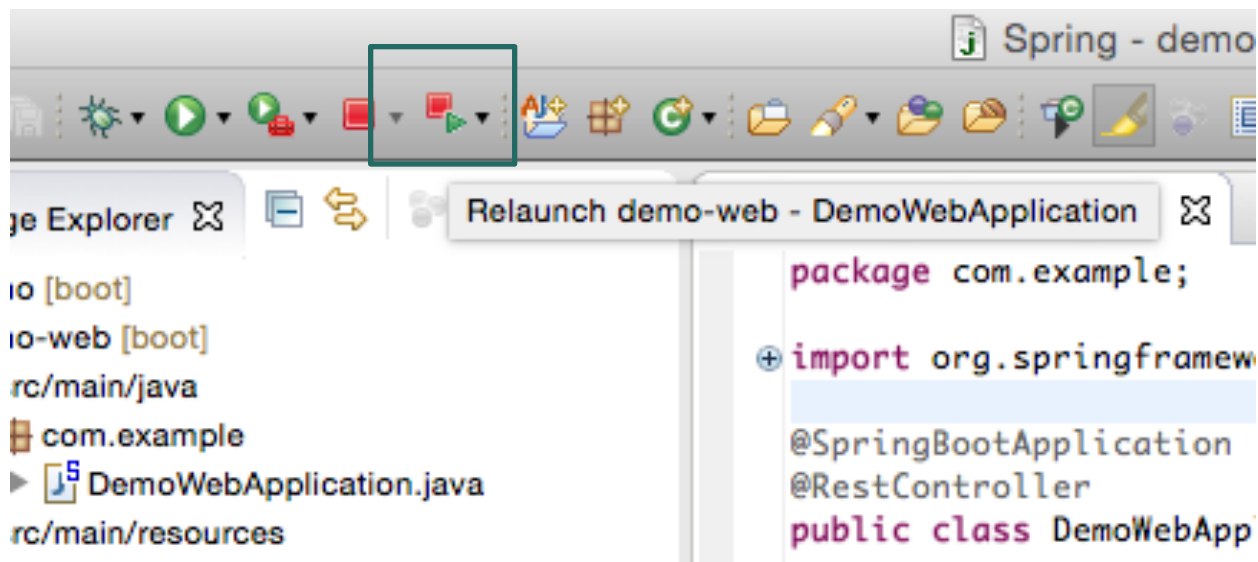


```
./X / _ _ _ , _ _ _ ( ) _ _ _ _ _ _ _ _ _ _  
( ) ¥ _ _ _ , _ _ _ ¥ / _ _ _ ¥ ¥ ¥ ¥ ¥ ¥ ¥ ¥ ¥ ¥  
¥ / _ _ _ ( ) _ | | | | | | | | | | ( ) | ) ) ) )  
_ | _ _ . _ | _ | _ | _ | _ ¥ _ _ / / / /  
=====|=====|_/=//_/_/  
:: Spring Boot ::          (v1.3.2.RELEASE)
```

Tomcat started on port(s): 8080 (http)

First Controller

```
@SpringBootApplication
@RestController
public class DemoApplication {
    @RequestMapping("/")
    String hello() {
        return "Hello World!";
    }
    public static void main(String[] args) {
        SpringApplication.run(DemoApplication.class,args);
    }
}
```

Output (02-02)

[illegible]

```

2016-02-03 10:38:24.543 INFO 34688 --- [main] com.example.DemoWebApplication : Starting DemoWebApplication on jpxxmakit1.corp.emc.com with PID 34688 (/Users/makit/demo/demo-web/target/classes started by makit in /Users/makit/demo/demo-web)
2016-02-03 10:38:24.546 INFO 34688 --- [main] com.example.DemoWebApplication : No active profile set, falling back to default profiles: default
2016-02-03 10:38:24.600 INFO 34688 --- [main] ationConfigEmbeddedWebApplicationContext : Refreshing org.springframework.boot.context.embedded.AnnotationConfigEmbeddedWebApplicationContext@314c508a: startup date [Wed Feb 03 10:38:24 JST 2016];
root of context hierarchy
2016-02-03 10:38:25.103 INFO 34688 --- [main] o.s.b.f.s.DefaultListableBeanFactory : Overriding bean definition for bean 'beanNameViewResolver' with a different definition: replacing [Root bean: class [null]; scope=; abstract=false; lazyInit=false; autowireMode=3; dependencyCheck=0; autowireCandidate=true; primary=false; factoryBeanName=org.springframework.boot.autoconfigure.web.ErrorMvcAutoConfiguration$WhitelabelErrorViewConfiguration; factoryMethodName=beanNameViewResolver; initMethodNames=null; destroyMethodNames=[inferred]; defined in class path resource [org/springframework/boot/autoconfigure/web/ErrorMvcAutoConfiguration$WhitelabelErrorViewConfiguration.class]] with [Root bean: class [null]; scope=; abstract=false; lazyInit=false; autowireMode=3; dependencyCheck=0; autowireCandidate=true; primary=false; factoryBeanName=org.springframework.boot.autoconfigure.web.WebMvcAutoConfiguration$WebMvcAutoConfigurationAdapter; factoryMethodName=beanNameViewResolver; initMethodNames=null; destroyMethodNames=[inferred]; defined in class path resource [org/springframework/boot/autoconfigure/web/WebMvcAutoConfiguration$WebMvcAutoConfigurationAdapter.class]]
2016-02-03 10:38:25.709 INFO 34688 --- [main] s.b.c.e.t.TomcatEmbeddedServletContainer : Tomcat initialized with port(s): 8080 (http)
2016-02-03 10:38:25.722 INFO 34688 --- [main] o.apache.catalina.core.StandardService : Starting service Tomcat
2016-02-03 10:38:25.723 INFO 34688 --- [main] org.apache.catalina.core.StandardEngine : Starting Servlet Engine: Apache Tomcat/8.0.30
2016-02-03 10:38:25.824 INFO 34688 --- [ost-startStop-1] o.a.c.c.c.[Tomcat].[localhost].[/] : Initializing Spring embedded WebApplicationContext
2016-02-03 10:38:25.824 INFO 34688 --- [ost-startStop-1] o.s.web.context.ContextLoader : Root WebApplicationContext: initialization completed in 1227 ms
2016-02-03 10:38:26.103 INFO 34688 --- [ost-startStop-1] o.s.b.c.e.ServletRegistrationBean : Mapping servlet: 'dispatcherServlet' to [/]
2016-02-03 10:38:26.107 INFO 34688 --- [ost-startStop-1] o.s.b.c.e.FilterRegistrationBean : Mapping filter: 'characterEncodingFilter' to: [/]
2016-02-03 10:38:26.108 INFO 34688 --- [ost-startStop-1] o.s.b.c.e.FilterRegistrationBean : Mapping filter: 'hiddenHttpMethodFilter' to: [/]
2016-02-03 10:38:26.108 INFO 34688 --- [ost-startStop-1] o.s.b.c.e.FilterRegistrationBean : Mapping filter: 'httpPutFormContentFilter' to: [/]
2016-02-03 10:38:26.108 INFO 34688 --- [ost-startStop-1] o.s.b.c.e.FilterRegistrationBean : Mapping filter: 'requestContextFilter' to: [/]
2016-02-03 10:38:26.329 INFO 34688 --- [main] s.w.s.m.m.a.RequestMappingHandlerAdapter : Looking for @ControllerAdvice: org.springframework.boot.context.embedded.AnnotationConfigEmbeddedWebApplicationContext@314c508a: startup date [Wed Feb 03 10:38:24 JST 2016]; root of context hierarchy

```

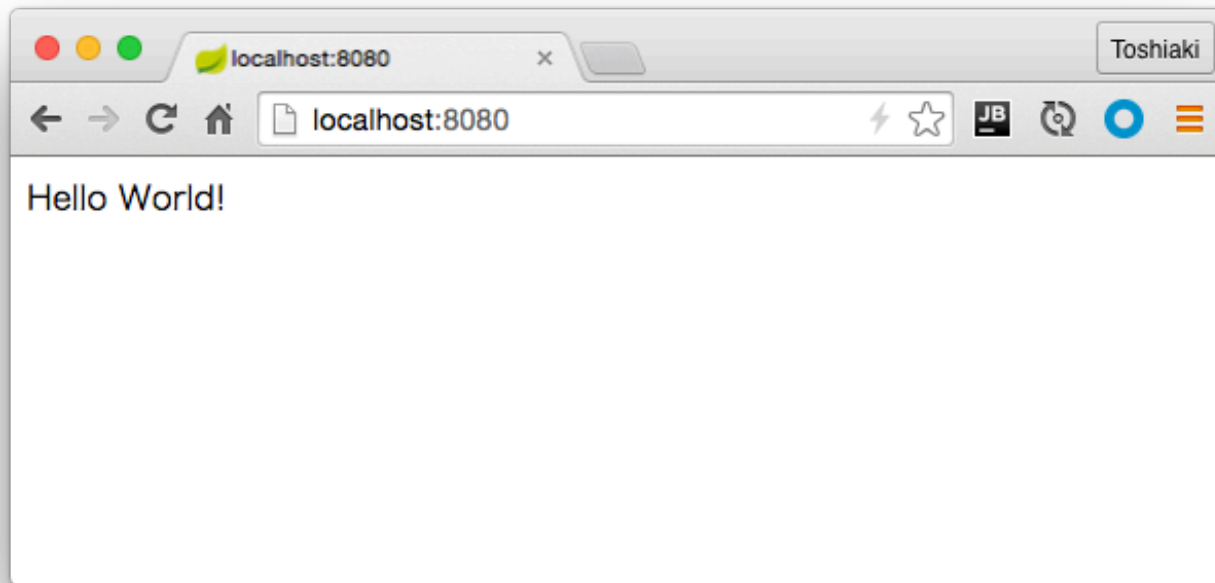
```
2016-02-03 10:38:26.392 INFO 34688 --- [main] s.w.s.m.a.RequestMappingHandlerMapping: Mapped "{[/]}" onto java.lang.String
com.example.DemoWebApplication.hello()
```

```

2016-02-03 10:38:26.394 INFO 346888 --- [main] o.s.w.s.m.m.a.RequestMappingHandlerMapping: Mapped "[{error}]" onto public org.springframework.http.ResponseEntity<java.util.Map<java.lang.String, java.lang.Object>>
org.springframework.web.servlet.mvc.annotation.annotation.AnnotationMethodHandlerAdapter:140
2016-02-03 10:38:26.395 INFO 346888 --- [main] s.w.s.m.m.a.RequestMappingHandlerMapping: Mapped "[{error}.produces[\"text/html\"]]" onto public org.springframework.web.servlet.ModelAndView
org.springframework.web.servlet.mvc.annotation.annotation.AnnotationMethodHandlerAdapter:140
2016-02-03 10:38:26.421 INFO 346888 --- [main] o.s.w.s.handler.SimpleUrlHandlerMapping: Mapped URL path [/webjars/**] onto handler of type [class org.springframework.web.servlet.resource.ResourceHttpRequestHandler]
2016-02-03 10:38:26.421 INFO 346888 --- [main] o.s.w.s.handler.SimpleUrlHandlerMapping: Mapped URL path [/**] onto handler of type [class org.springframework.web.servlet.resource.ResourceHttpRequestHandler]
2016-02-03 10:38:26.459 INFO 346888 --- [main] o.s.w.s.handler.SimpleUrlHandlerMapping: Mapped URL path [/**/favicon.ico] onto handler of type [class org.springframework.web.servlet.resource.ResourceHttpRequestHandler]
2016-02-03 10:38:26.575 INFO 346888 --- [main] o.s.j.e.a.AnnotationMethodExporter: Registering beans for JMX exposure on startup
2016-02-03 10:38:26.648 INFO 346888 --- [main] s.b.c.e.t.TomcatEmbeddedServletContainer: Tomcat started on port(s): 8080 (http)
2016-02-03 10:38:26.654 INFO 346888 --- [main] com.example.DemoWebApplication: Started DemoWebApplication in 2.337 seconds (JVM running for 2.826)

```

<http://localhost:8080>



Create new Controller (REST API)

```
package com.example;

public class City {
    private Integer id;
    private String name;

    public Integer getId() {
        return id;
    }
    public void setId(Integer id) {
        this.id = id;
    }
    public String getName() {
        return name;
    }
    public void setName(String name) {
        this.name = name;
    }
}
```

Create new Controller (REST API)

```
@RestController
public class CityController {
    static List<City> cities = new CopyOnWriteArrayList<>();
    static AtomicInteger counter = new AtomicInteger(0);

    @RequestMapping(value = "/cities", method = RequestMethod.GET)
    List<City> getCities() {
        return cities;
    }

    @RequestMapping(value = "/cities", method = RequestMethod.POST)
    City postCities(@RequestBody City city) {
        city.setId(counter.incrementAndGet());
        cities.add(city);
        return city;
    }
}
```

[illegible]

```

2016-02-03 12:29:22.546 INFO 35680 --- [main] s.w.s.m.m.a.RequestMappingHandlerMapping : Mapped "{[/cities],methods=[GET]}" onto
java.util.List<com.example.City> com.example.CityController.getCities()

2016-02-03 12:29:22.547 INFO 35680 --- [main] s.w.s.m.m.a.RequestMappingHandlerMapping : Mapped "{[/cities],methods=[POST]}" onto
com.example.City com.example.CityController.postCities(com.example.City)

2016-02-03 12:29:22.549 INFO 35680 --- [main] s.w.s.m.m.a.RequestMappingHandlerMapping : Mapped "{[/error]}" onto public org.springframework.http.ResponseEntity<java.util.Map<java.lang.String, java.lang.Object>>
org.springframework.boot.autoconfigure.web.BasicErrorController.error(javax.servlet.http.HttpServletRequest)
2016-02-03 12:29:22.549 INFO 35680 --- [main] s.w.s.m.m.a.RequestMappingHandlerMapping : Mapped "{[/error],produces=[text/html]}" onto public org.springframework.web.servlet.ModelAndView
org.springframework.boot.autoconfigure.web.BasicErrorController.renderHtml(javax.servlet.http.HttpServletRequest,javax.servlet.http.HttpServletResponse)
2016-02-03 12:29:22.572 INFO 35680 --- [main] o.s.w.s.handler.SimpleUrlHandlerMapping : Mapped URL path [/webjars/**] onto handler of type [class org.springframework.web.servlet.resource.ResourceHttpRequestHandler]
2016-02-03 12:29:22.572 INFO 35680 --- [main] o.s.w.s.handler.SimpleUrlHandlerMapping : Mapped URL path [/**] onto handler of type [class org.springframework.web.servlet.resource.ResourceHttpRequestHandler]
2016-02-03 12:29:22.600 INFO 35680 --- [main] o.s.w.s.handler.SimpleUrlHandlerMapping : Mapped URL path [/**/favicon.ico] onto handler of type [class org.springframework.web.servlet.resource.ResourceHttpRequestHandler]
2016-02-03 12:29:22.716 INFO 35680 --- [main] o.s.j.e.a.AnnotationMethodProcessor : Registering beans for JMX exposure on startup
2016-02-03 12:29:22.778 INFO 35680 --- [main] s.b.c.e.t.TomcatEmbeddedServletContainer : Tomcat started on port(s): 8080 (http)
2016-02-03 12:29:22.783 INFO 35680 --- [main] com.example.DemoWebApplication : Started DemoWebApplication in 2.036 seconds (JVM running for 2.457)

```

Access REST API

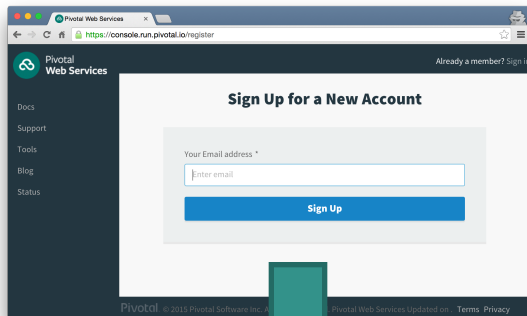
```
$ curl -X GET http://localhost:8080/cities
[]
$ curl -X POST http://localhost:8080/cities -H "Content-Type:
application/json" -d '{"name":"Tokyo"}'
{"id":1,"name":"Tokyo"}
$ curl -X POST http://localhost:8080/cities -H "Content-Type:
application/json" -d '{"name":"Osaka"}'
{"id":2,"name":"Osaka"}
$ curl -X GET http://localhost:8080/cities
[{"id":1,"name":"Tokyo"}, {"id":2,"name":"Osaka"}]
```

Build the application

```
$ cd demo-web  
$ mvn clean package -Dmaven.test.skip=true  
$ java -jar target/demo-web-0.0.1-SNAPSHOT.jar
```


Push to Cloud Foundry

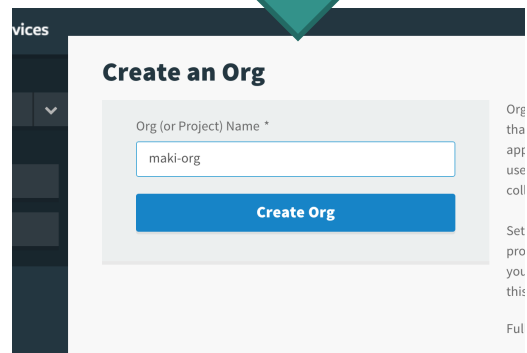
<https://console.run.pivotal.io/register>



Sign Up for a New Account

Your Email address *

Sign Up

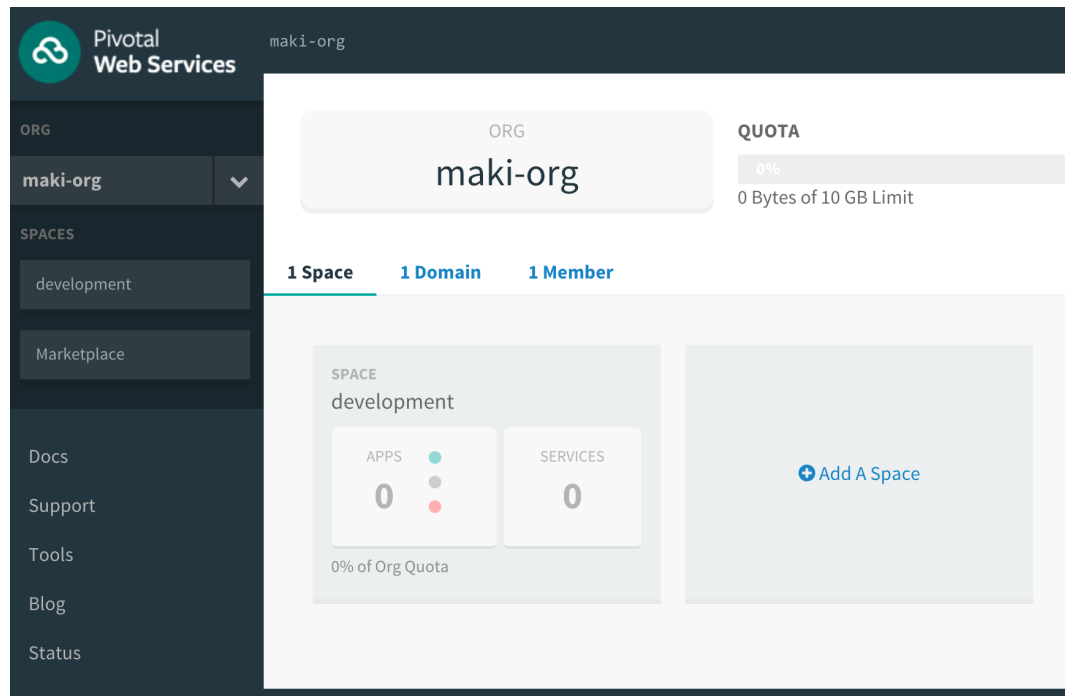
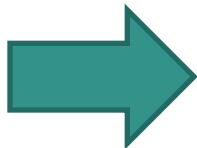


Create an Org

Org (or Project) Name *

maki-org

Create Org



Pivotal Web Services

maki-org

ORG

maki-org

QUOTA

0%

0 Bytes of 10 GB Limit

SPACES

development

Marketplace

1 Space 1 Domain 1 Member

SPACE development

APPS 0 SERVICES 0

0% of Org Quota

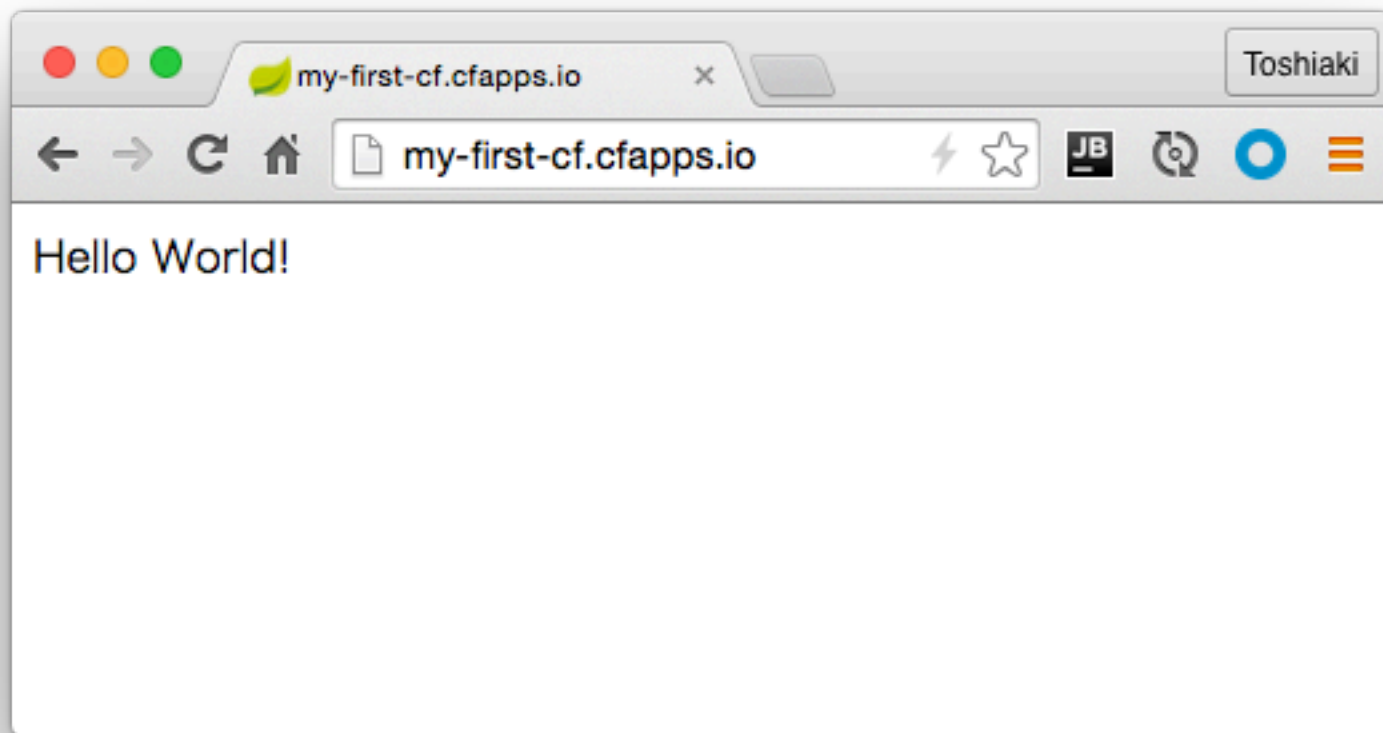
+ Add A Space

Push to Cloud Foundry

```
$ cf login -a api.run.pivotal.io
$ cf push my-first-cf -p target/demo-web-0.0.1-SNAPSHOT.jar
Showing health and status for app my-first-cf in org maki-org / space development as
foo@example.com ...
OK
```

```
requested state: started
instances: 1/1
usage: 1G x 1 instances
urls: my-first-cf.cfapps.io
last uploaded: Wed Feb 3 04:08:46 UTC 2016
stack: cflinuxfs2
buildpack: java-buildpack=v3.5.1-http://github.com/pivotal-cf/pcf-java-
buildpack.git#d6c19f8 java-main open-jdk-like-jre=1.8.0_71 open-jdk-like-memory-
calculator=2.0.1_RELEASE spring-auto-reconfiguration=1.10.0_RELEASE
```

	state	since	cpu	memory	disk	details
#0	running	2016-02-03 01:14:12 PM	38.6%	378.2M of 1G	135.8M of 1G	

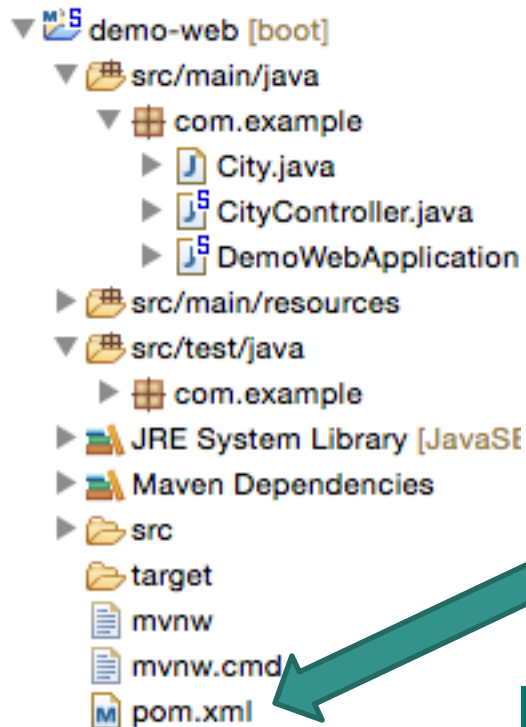


Database Access

Add dependencies

Add

```
<dependency>
  <groupId>org.springframework.boot</groupId>
  <artifactId>spring-boot-starter-jdbc</artifactId>
</dependency>
<dependency>
  <groupId>com.h2database</groupId>
  <artifactId>h2</artifactId>
  <scope>runtime</scope>
</dependency>
```

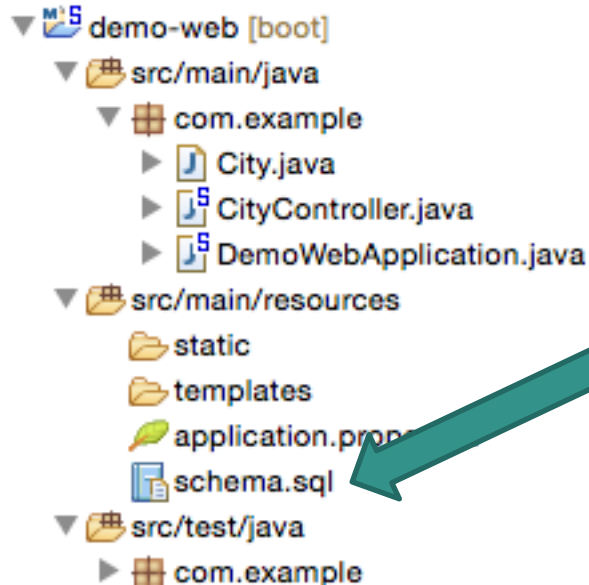


Use JdbcTemplate

```
@RestController
public class CityController {
    @Autowired
    JdbcTemplate jdbcTemplate;
    @RequestMapping(value = "/cities", method = RequestMethod.GET)
    List<City> getCities() {
        return jdbcTemplate.query("SELECT id, name FROM city ORDER BY id", (rs, i) -> {
            City city = new City();
            city.setId(rs.getInt("id"));
            city.setName(rs.getString("name"));
            return city;
        });
    }
    @RequestMapping(value = "/cities", method = RequestMethod.POST)
    City postCities(@RequestBody City city) {
        jdbcTemplate.update("INSERT INTO city(name) VALUES(?)", city.getName());
        return city;
    }
}
```

Create DDL file

Create schema.sql



```
CREATE TABLE city (  
    id    INT PRIMARY KEY AUTO_INCREMENT,  
    name  VARCHAR(255)  
);
```

Re-Run & Access API (03-01)

```

  ____
 / ___/  ____
(  _  ) / ___/
 \  __/  \  __/
  \___)  \___)
=====
:: Spring Boot :: (v1.3.2.RELEASE)

```

```

2016-02-03 16:06:29.588 INFO 38357 --- [main] com.example.DemoWebApplication : Starting DemoWebApplication on jpxxmakit1m.corp.emc.com with PID 38357 (/Users/makit/demo/demo-web/target/classes started by makitin /Users/makit/demo/demo-web)
2016-02-03 16:06:29.591 INFO 38357 --- [main] com.example.DemoWebApplication : No active profile set, falling back to default profiles: default
2016-02-03 16:06:29.637 INFO 38357 --- [main] ationConfigEmbeddedWebApplicationContext : Refreshing org.springframework.boot.context.embedded.AnnotationConfigEmbeddedWebApplicationContext@68ceda24: startup date [Wed Feb 03 16:06:29 JST 2016]; root of context hierarchy
2016-02-03 16:06:30.158 INFO 38357 --- [main] o.s.b.f.s.DefaultListableBeanFactory : Overriding bean definition for bean 'beanNameViewResolver' with a different definition: replacing [Root bean: class [null]; scope=; abstract=false; lazyInit=false; autowireMode=3; dependencyCheck=0; defined in class path resource [org/springframework/boot/autoconfigure/web/ErrorHandlerAutoConfiguration$WhitelabelErrorViewConfiguration.class]] with [Root bean: class [null]; scope=; abstract=false; lazyInit=false; autowireMode=3; dependencyCheck=0; defined in class path resource [org/springframework/boot/autoconfigure/web/WhitelabelErrorViewConfiguration$WhitelabelErrorViewConfiguration.class]]
2016-02-03 16:06:30.397 INFO 38357 --- [main] org.springframework.transaction.annotation.ProxyTransactionManagementConfiguration$EnhancerBySpringCGIProxy$1 : Bean 'org.springframework.transaction.annotation.ProxyTransactionManagementConfiguration' of type [class org.springframework.transaction.annotation.ProxyTransactionManagementConfiguration$EnhancerBySpringCGIProxy$1] is not eligible for getting processed by all BeanPostProcessors (for example: not eligible for auto-proxying)
2016-02-03 16:06:30.760 INFO 38357 --- [main] s.b.c.e.t.TomcatEmbeddedServletContainer : Tomcat initialized with port(s): 8080 (http)
2016-02-03 16:06:30.772 INFO 38357 --- [main] o.apache.catalina.core.StandardService : Starting service Tomcat
2016-02-03 16:06:30.773 INFO 38357 --- [main] org.apache.catalina.core.StandardEngine : Starting Servlet Engine: Apache Tomcat/8.0.30
2016-02-03 16:06:30.849 INFO 38357 --- [ost-startStop-1] o.a.c.c.C.[Tomcat].[localhost].[/] : Initializing Spring embedded WebApplicationContext
2016-02-03 16:06:30.849 INFO 38357 --- [ost-startStop-1] o.s.web.context.ContextLoader : Root WebApplicationContext: initialization completed in 1215 ms
2016-02-03 16:06:31.083 INFO 38357 --- [ost-startStop-1] o.s.b.c.e.s.ServletRegistrationBean : Mapping servlet: 'dispatcherServlet' to [/]
2016-02-03 16:06:31.087 INFO 38357 --- [ost-startStop-1] o.s.b.c.e.f.FilterRegistrationBean : Mapping filter: 'characterEncodingFilter' to: [/]
2016-02-03 16:06:31.088 INFO 38357 --- [ost-startStop-1] o.s.b.c.e.f.FilterRegistrationBean : Mapping filter: 'hiddenHttpMethodFilter' to: [/]
2016-02-03 16:06:31.088 INFO 38357 --- [ost-startStop-1] o.s.b.c.e.f.FilterRegistrationBean : Mapping filter: 'httpPutFormContentFilter' to: [/]
2016-02-03 16:06:31.088 INFO 38357 --- [ost-startStop-1] o.s.b.c.e.f.FilterRegistrationBean : Mapping filter: 'requestContextFilter' to: [/]

```

2016-02-03 16:06:31.357 INFO 38357 --- [main] o.s.jdbc.datasource.init.ScriptUtils : Executing SQL script from URL [file:/Users/makit/demo/demo-web/target/classes/schema.sql]

2016-02-03 16:06:31.367 INFO 38357 --- [main] o.s.jdbc.datasource.init.ScriptUtils : Executed SQL script from URL [file:/Users/makit/demo/demo-web/target/classes/schema.sql] in 10 ms.

```

2016-02-03 16:06:31.564 INFO 38357 --- [main] s.w.s.m.m.a.RequestMappingHandlerAdapter : Looking for @ControllerAdvice: org.springframework.boot.context.embedded.AnnotationConfigEmbeddedWebApplicationContext@68ceda24: startup date [Wed Feb 03 16:06:29 JST 2016]; root of context hierarchy
2016-02-03 16:06:31.617 INFO 38357 --- [main] s.w.s.m.m.a.RequestMappingHandlerMapping : Mapped "{[/]}" onto java.lang.String com.example.DemoWebApplication.hello()
2016-02-03 16:06:31.619 INFO 38357 --- [main] s.w.s.m.m.a.RequestMappingHandlerMapping : Mapped "{[/cities],methods=[GET]}" onto java.util.List<com.example.City> com.example.CityController.getCities()
2016-02-03 16:06:31.619 INFO 38357 --- [main] s.w.s.m.m.a.RequestMappingHandlerMapping : Mapped "{[/cities],methods=[POST]}" onto com.example.City com.example.CityController.postCities(com.example.City)
2016-02-03 16:06:31.621 INFO 38357 --- [main] s.w.s.m.m.a.RequestMappingHandlerMapping : Mapped "{[/error]}" onto public org.springframework.http.ResponseEntity<java.util.Map<java.lang.String, java.lang.Object>> org.springframework.boot.autoconfigure.web.BasicExceptionHandler.handle(javax.servlet.http.HttpServletRequest)
2016-02-03 16:06:31.621 INFO 38357 --- [main] s.w.s.m.m.a.RequestMappingHandlerMapping : Mapped "{[/error],produces=[text/html]}" onto public org.springframework.web.servlet.ModelAndView org.springframework.boot.autoconfigure.web.BasicExceptionHandler.handleHtml(javax.servlet.http.HttpServletRequest, javax.servlet.http.HttpServletResponse)
2016-02-03 16:06:31.644 INFO 38357 --- [main] o.s.w.s.handler.SimpleUrlHandlerMapping : Mapped URL path [/{webjars/**}] onto handler of type [class org.springframework.web.servlet.resource.ResourceHttpRequestHandler]
2016-02-03 16:06:31.644 INFO 38357 --- [main] o.s.w.s.handler.SimpleUrlHandlerMapping : Mapped URL path [/**] onto handler of type [class org.springframework.web.servlet.resource.ResourceHttpRequestHandler]
2016-02-03 16:06:31.681 INFO 38357 --- [main] o.s.w.s.handler.SimpleUrlHandlerMapping : Mapped URL path [/{favicon.ico}] onto handler of type [class org.springframework.web.servlet.resource.ResourceHttpRequestHandler]
2016-02-03 16:06:31.848 INFO 38357 --- [main] o.s.j.e.a.AnnotationMethodExporter : Registering beans for JMX exposure on startup
2016-02-03 16:06:31.911 INFO 38357 --- [main] s.b.c.e.t.TomcatEmbeddedServletContainer : Tomcat started on port(s): 8080 (http)
2016-02-03 16:06:31.915 INFO 38357 --- [main] com.example.DemoWebApplication : Started DemoWebApplication in 2.572 seconds (JVM running for 2.871)

```


Re-Run & Access API (03-01)


```
$ curl -X GET http://localhost:8080/cities
[]
$ curl -X POST http://localhost:8080/cities -H "Content-Type:
application/json" -d '{"name":"Tokyo"}'
{"id":null,"name":"Tokyo"}
$ curl -X POST http://localhost:8080/cities -H "Content-Type:
application/json" -d '{"name":"Osaka"}'
{"id":null,"name":"Osaka"}
$ curl -X GET http://localhost:8080/cities
[{"id":1,"name":"Tokyo"}, {"id":2,"name":"Osaka"}]
```

Use Spring Data JPA

```
<dependencies>
  <dependency>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-web</artifactId>
  </dependency>
  <dependency>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-data-jpa</artifactId>
  </dependency>
  <dependency>
    <groupId>com.h2database</groupId>
    <artifactId>h2</artifactId>
    <scope>runtime</scope>
  </dependency>
  <dependency>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-test</artifactId>
    <scope>test</scope>
  </dependency>
</dependencies>
```

```
<dependency>
  <groupId>org.springframework.boot</groupId>
  <artifactId>spring-boot-starter-data-jpa</artifactId>
</dependency>
```

Instead of
starter-jdbc



Create JPA's Entity

```
@Entity
public class City {
    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    private Integer id;
    private String name;
    public Integer getId() {
        return id;
    }
    public void setId(Integer id) {
        this.id = id;
    }
    public String getName() {
        return name;
    }
    public void setName(String name) {
        this.name = name;
    }
}
```

Create Repository

```
package com.example;

import org.springframework.data.jpa.repository.JpaRepository;

public interface CityRepository extends JpaRepository<City, Integer> {

}
```

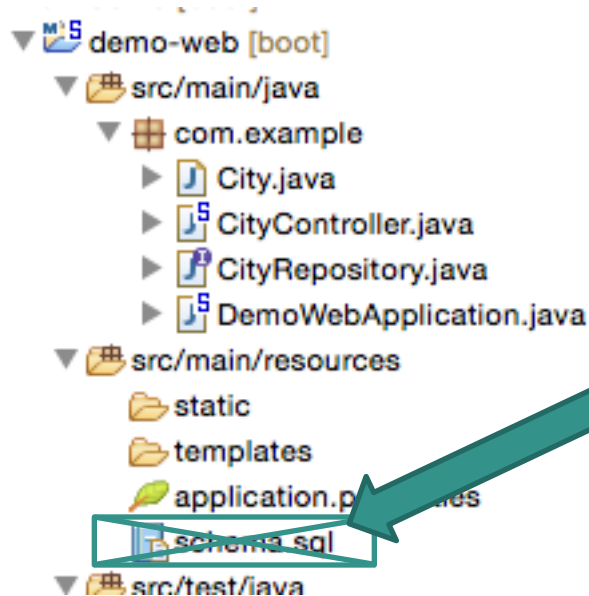
Use CityRepository

```
@RestController
public class CityController {
    @Autowired
    CityRepository cityRepository;

    @RequestMapping(value = "/cities", method = RequestMethod.GET)
    List<City> getCities() {
        return cityRepository.findAll();
    }

    @RequestMapping(value = "/cities", method = RequestMethod.POST)
    City postCities(@RequestBody City city) {
        return cityRepository.save(city);
    }
}
```

Remove DDL file



Remove schema.sql
JPA generates schema
automatically

Re-Run (03-02)

[illegible]

```

2016-02-03 16:04:18.599 INFO 38354 --- [ main] com.example.DemoWebApplication : Starting DemoWebApplication on jpxmakitml.corp.emc.com with PID 38354 (/Users/makiti/demo/de-mo-w eb/t/arge t/classe s started by makiti in /Users/makiti/demo/de-mo-w eb)
2016-02-03 16:04:18.602 INFO 38354 --- [ main] com.example.DemoWebApplication : No active profile set, falling back to default profiles: default
2016-02-03 16:04:18.613 INFO 38354 --- [ main] org.springframework.web.servlet.mvc.annotation.AnnotationMethodHandlerMethod : Refreshing org.springframework.context.support.AnnotationConfigApplicationContext with bean 'beanNameViewResolver' with a different definition: replacing (Root bean: class [null]; scope: abstract=false; lazyinit=false; autowireMode=3; dependencyCheck=0; autowiredCandidate=true; primary=false; factoryBeanName=org.springframework.web.servlet.mvc.annotation.AnnotationMethodHandlerMethod; factoryMethodName=createViewResolver; initMethodName=init; destroyMethodName=destroyViewResolver; defined in class path resource [org/springframework/web/servlet/mvc/annotation/AnnotationMethodHandlerMethod.class]) with (Root bean: class [null]; scope: abstract=false; lazyinit=false; autowiredCandidate=true; primary=false; factoryBeanName=org.springframework.web.servlet.mvc.annotation.AnnotationMethodHandlerMethod; factoryMethodName=createViewResolver; initMethodName=init; destroyMethodName=destroyViewResolver; defined in class path resource [org/springframework/web/servlet/mvc/annotation/AnnotationMethodHandlerMethod.class])
2016-02-03 16:04:19.678 INFO 38354 --- [ main] org.springframework.web.servlet.mvc.annotation.AnnotationMethodHandlerMethod : Bean 'org.springframework.transaction.annotation.ProxyTransactionAttributeSource' of type [class org.springframework.transaction.annotation.ProxyTransactionAttributeSource] is not eligible for getting processed by all BeanPostProcessors (for example: not eligible for auto-proxying)
2016-02-03 16:04:19.678 INFO 38354 --- [ main] org.springframework.web.servlet.mvc.annotation.AnnotationMethodHandlerMethod : Tomcat initialized with port(s): 8080 (http)
2016-02-03 16:04:20.074 INFO 38354 --- [ main] org.apache.catalina.core.StandardService : Starting service Tomcat
2016-02-03 16:04:20.091 INFO 38354 --- [ main] org.apache.catalina.core.StandardEngine : Starting Servlet Engine: Apache Tomcat/8.0.30
2016-02-03 16:04:20.183 INFO 38354 --- [ost-startStop-1] org.apache.catalina.core.StandardContext : Initializing Spring embedded WebApplicationContext
2016-02-03 16:04:20.183 INFO 38354 --- [ost-startStop-1] org.springframework.web.servlet.mvc.annotation.AnnotationMethodHandlerMethod : Root WebApplicationContext: initialization completed in 1533 ms
2016-02-03 16:04:20.473 INFO 38354 --- [ost-start-1] org.springframework.web.servlet.mvc.annotation.AnnotationMethodHandlerMethod : o.s.b.c.e.ServletRegistrationBean : Mapping filter: 'dispatcherServlet' to [/]
2016-02-03 16:04:20.473 INFO 38354 --- [ost-start-1] org.springframework.web.servlet.mvc.annotation.AnnotationMethodHandlerMethod : o.s.b.c.e.FilterRegistrationBean : Mapping filter: 'characterEncodingFilter' to [/]
2016-02-03 16:04:20.473 INFO 38354 --- [ost-startStop-1] org.springframework.web.servlet.mvc.annotation.AnnotationMethodHandlerMethod : o.s.b.c.e.FilterRegistrationBean : Mapping filter: 'hiddenHttpMethodFilter' to [/]
2016-02-03 16:04:20.473 INFO 38354 --- [ost-startStop-1] org.springframework.web.servlet.mvc.annotation.AnnotationMethodHandlerMethod : o.s.b.c.e.FilterRegistrationBean : Mapping filter: 'httpPutFormContentFilter' to [/]
2016-02-03 16:04:20.473 INFO 38354 --- [ost-startStop-1] org.springframework.web.servlet.mvc.annotation.AnnotationMethodHandlerMethod : o.s.b.c.e.FilterRegistrationBean : Mapping filter: 'requestContextFilter' to [/]
2016-02-03 16:04:20.869 INFO 38354 --- [ main] j.LocalContainerEntityManagerFactoryBean : Building JPA container EntityManagerFactory for persistence unit 'default'
2016-02-03 16:04:20.869 INFO 38354 --- [ main] org.hibernate.jpa.internal.util.LogHelper : HHH000284: Processing PersistenceUnitInfo [
    name: default
    ...]
2016-02-03 16:04:20.929 INFO 38354 --- [ main] org.hibernate.Version : HHH000041: Hibernate Core (4.3.11.Final)
2016-02-03 16:04:20.931 INFO 38354 --- [ main] org.hibernate.cfg.Environment : HHH000266: hibernate.properties not found
2016-02-03 16:04:20.933 INFO 38354 --- [ main] org.hibernate.cfg.Environment : HHH000021: bytecode provider name: javassist
2016-02-03 16:04:21.156 INFO 38354 --- [ main] org.hibernate.annotations.common.Version : HHH000031: Hibernate Commons Annotations (4.0.5.Final)
2016-02-03 16:04:21.213 INFO 38354 --- [ main] org.hibernate.dialect.Dialect : HHH000040: org.hibernate.dialect.H2Dialect
2016-02-03 16:04:21.304 INFO 38354 --- [ main] org.h.h.i.ast.ASTQueryTranslatorFactory : HHH000397: Using ASTQueryTranslatorFactory
2016-02-03 16:04:21.472 INFO 38354 --- [ main] org.hibernate.tool.hbm2ddl.SchemaExport : HHH000227: Running hbm2ddl schema export
2016-02-03 16:04:21.478 INFO 38354 --- [ main] org.hibernate.tool.hbm2ddl.SchemaExport : HHH000230: Schema export complete
2016-02-03 16:04:21.899 INFO 38354 --- [ main] s.w.s.m.m.a.RequestMappingHandlerMethod : Looking for @ControllerAdvice: org.springframework.context.support.AnnotationConfigApplicationContext with bean 'beanNameViewResolver' with a different definition: replacing (Root bean: class [null]; scope: abstract=false; lazyinit=false; autowireMode=3; dependencyCheck=0; autowiredCandidate=true; primary=false; factoryBeanName=org.springframework.web.servlet.mvc.annotation.AnnotationMethodHandlerMethod; factoryMethodName=createViewResolver; initMethodName=init; destroyMethodName=destroyViewResolver; defined in class path resource [org/springframework/web/servlet/mvc/annotation/AnnotationMethodHandlerMethod.class]) with (Root bean: class [null]; scope: abstract=false; lazyinit=false; autowiredCandidate=true; primary=false; factoryBeanName=org.springframework.web.servlet.mvc.annotation.AnnotationMethodHandlerMethod; factoryMethodName=createViewResolver; initMethodName=init; destroyMethodName=destroyViewResolver; defined in class path resource [org/springframework/web/servlet/mvc/annotation/AnnotationMethodHandlerMethod.class])
2016-02-03 16:04:21.864 INFO 38354 --- [ main] s.w.s.m.m.a.RequestMappingHandlerMethod : Mapping ["/"] onto java.lang.String com.example.DemoWebApplication.hello()
2016-02-03 16:04:21.865 INFO 38354 --- [ main] s.w.s.m.m.a.RequestMappingHandlerMethod : Mapping ["/{cities},methods={GET}"] onto java.util.List com.example.CityController.getCityes()
2016-02-03 16:04:21.866 INFO 38354 --- [ main] s.w.s.m.m.a.RequestMappingHandlerMethod : Mapping ["/{cities},methods={POST}"] onto com.example.City com.example.CityController.postCityes(com.example.City)
2016-02-03 16:04:21.869 INFO 38354 --- [ main] s.w.s.m.m.a.RequestMappingHandlerMethod : Mapping ["/{error}"] onto public org.springframework.http.ResponseEntity java.util.List java.util.List java.lang.String, java.Lang.Object>
2016-02-03 16:04:21.869 INFO 38354 --- [ main] s.w.s.m.m.a.RequestMappingHandlerMethod : Mapping ["/{error},produces={text/html}"] onto public org.springframework.web.servlet.ModelAndView
2016-02-03 16:04:21.895 INFO 38354 --- [ main] s.w.s.h.SimpleRiaHandlerMethod : Mapping URL path [webjars/**] onto handler of type [class org.springframework.web.servlet.ResourceHttpRequestHandler]
2016-02-03 16:04:21.895 INFO 38354 --- [ main] s.w.s.h.SimpleRiaHandlerMethod : Mapping URL path [/**] onto handler of type [class org.springframework.web.servlet.ResourceHttpRequestHandler]
2016-02-03 16:04:21.927 INFO 38354 --- [ main] s.w.s.h.SimpleRiaHandlerMethod : Mapping URL path [/**/favicon.ico] onto handler of type [class org.springframework.web.servlet.ResourceHttpRequestHandler]
2016-02-03 16:04:22.099 INFO 38354 --- [ main] s.b.c.e.t.TomcatEmbeddedServletContainer : o.s.j.a.AnnotationMethodHandlerMethod : Tomcat started on port(s): 8080 (http)
2016-02-03 16:04:22.168 INFO 38354 --- [ main] com.example.DemoWebApplication : Started DemoWebApplication in 3.807 seconds (JVM running for 4.127)

```

Access API

```
$ curl -X GET http://localhost:8080/cities
[]
$ curl -X POST http://localhost:8080/cities -H "Content-Type:
application/json" -d '{"name":"Tokyo"}'
{"id":1,"name":"Tokyo"}
$ curl -X POST http://localhost:8080/cities -H "Content-Type:
application/json" -d '{"name":"Osaka"}'
{"id":2,"name":"Osaka"}
$ curl -X GET http://localhost:8080/cities
[{"id":1,"name":"Tokyo"}, {"id":2,"name":"Osaka"}]
```


Push to Cloud Foundry with PostgreSQL

```
$ mvn clean package -Dmaven.test.skip=true
$ cf push my-second-cf -p target/demo-web-0.0.1-SNAPSHOT.jar --no-start
$ cf create-service elephantsql turtle demo-pg
$ cf bind-service my-second-cf demo-pg
$ cf set-env my-second-cf spring.jpa.hibernate.ddl-auto update
$ cf start my-second-cf
```

Push to Cloud Foundry with PostgreSQL

```
Starting app my-second-cf in org maki-org / space development as
...
Creating container
Successfully created container
Downloading app package...
Downloaded app package (23.3M)
Staging...
-----> Java Buildpack Version: v3.5.1 | http://github.com/pivotal-cf/pcf-java-buildpack.git#d6c19f8
-----> Downloading Open Jdk JRE 1.8.0_71 from https://download.run.pivotal.io/openjdk/trusty/x86_64/openjdk-1.8.0_71.tar.gz
(1.0s)
    Expanding Open Jdk JRE to .java-buildpack/open_jdk_jre (1.0s)
-----> Downloading Open JDK Like Memory Calculator 2.0.1_RELEASE from https://download.run.pivotal.io/memory-
calculator/trusty/x86_64/memory-calculator-2.0.1_RELEASE.tar.gz (0.0s)
    Memory Settings: -Xss1M -Xmx768M -XX:MaxMetaspaceSize=104857K -Xms768M -XX:MetaspaceSize=104857K
-----> Downloading PostgreSQL JDBC 9.4.1207 from
https://download.run.pivotal.io/postgresql-jdbc/postgresql-jdbc-9.4.1207.jar (0.0s)
-----> Downloading Spring Auto Reconfiguration 1.10.0_RELEASE from https://download.run.pivotal.io/auto-reconfiguration/auto-
reconfiguration-1.10.0_RELEASE.jar (0.0s)
Exit status 0
Staging complete
Uploading droplet, build artifacts cache...
Uploading droplet...
Uploading build artifacts cache...
Uploaded build artifacts cache (45.3M)
Uploaded droplet (68.8M)
Uploading complete
```

Cloud Foundry with PostgreSQL

```
$ cf logs my-second-cf --recent
```

```

[INFO] org.apache.tomcat.jdbc.pool.DataSource@5837583a{ConnectionPool[defaultAutoCommit=null; defaultReadOnly=null; defaultTransactionIsolation=-1; defaultCatalog=null; driverClassName=org.postgresql.Driver; maxActive=4; maxIdle=100; minIdle=0; initialSize=0; maxWait=30000; testOnBorrow=true; testOnReturn=false; timeBetweenEvictionRunsMillis=5000; numTestsPerEvictionRun=0; minEvictableIdleTimeMillis=60000; testWhileIdle=false; testOnConnect=false; password=*****; url=jdbc:postgresql://pelletfant-01.db.elephant.sql.com:5432/jttknhee?user=jttknhee&password=3TPD1LUSPJF9PhxRtRowA1kKn3gr0dE3; username=null; validationQuery=SELECT 1; validationQueryTimeout=-1; validatorClassName=null; validationInterval=30000; accessToUnderlyingConnectionAllowed=true; removeAbandoned=false; removeAbandonedTimeOut=60; logAbandoned=false; connectionProperties=null; initSQL=null; jdbcInterceptors=null; jmxEnabled=true; fairQueue=true; useEquals=true; abandonWhenPercentageFull=0; maxAge=0; useLock=false; dataSource=null; dataSourceJNDI=null; suspectTimeout=0; alternateUsernameAllowed=false; commitOnReturn=false; rollbackOnReturn=false; useDisposableConnectionFactory=true; logValidationErrors=false; propagateInterruptState=false; ignoreExceptionOnPreLoad=false; }

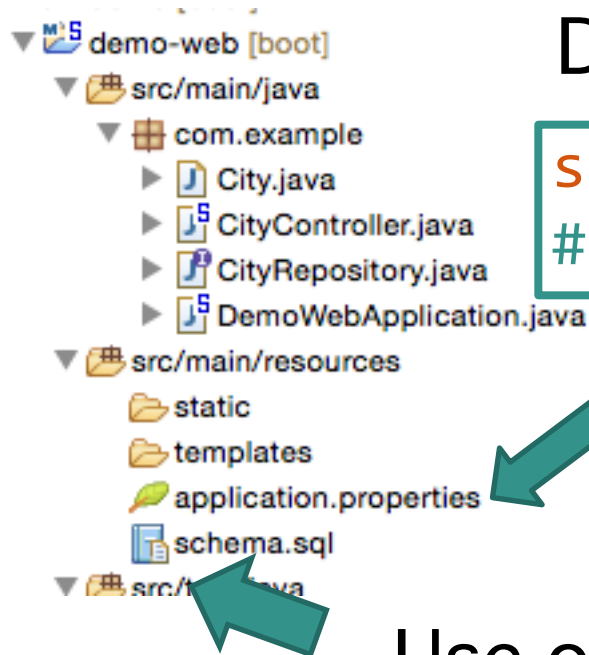
```

[illegible]

Access API

```
$ curl -X GET http://my-second-cf.cfapps.io/cities
[]
$ curl -X POST http://my-second-cf.cfapps.io/cities -H "Content-Type:
application/json" -d '{"name":"Tokyo"}'
{"id":1,"name":"Tokyo"}
$ curl -X POST http://my-second-cf.cfapps.io/cities -H "Content-Type:
application/json" -d '{"name":"Osaka"}'
{"id":2,"name":"Osaka"}
$ curl -X GET http://my-second-cf.cfapps.io/cities
[{"id":1,"name":"Tokyo"}, {"id":2,"name":"Osaka"}]
```

Want to use schema.sql?



Disable JPA to generate schema

```
spring.jpa.hibernate.ddl-auto=none  
# or validate
```

Use own schema.sql

[illegible]

```

2016-02-03 15:58:29.349 INFO 38161 --- [main] com.example.DemoWebApplication : Starting DemoWebApplication on jpxmakitml.corp.emc.com with PID 38161 (/Users/makit/demo/de-mo-web/target/classes started by makit in /Users/makit/demo/de-mo-web)
2016-02-03 15:58:29.352 INFO 38161 --- [main] com.example.DemoWebApplication : No active profile set, falling back to default profiles: default
2016-02-03 15:58:29.396 INFO 38161 --- [main] org.springframework.boot.context.embedded.AnnotationContextRefreshListener : Refreshing org.springframework.boot.context.embedded.AnnotationContextRefreshListener
2016-02-03 15:58:29.974 INFO 38161 --- [main] o.s.b.f.s.DefaultListableBeanFactory : Overriding bean definition for bean 'beanNameViewResolver' with a different definition: replacing Root bean: class [null]; scope=abstract=false; lazyInit=false; autowireMode=3; dependencyCheck=0; defined in class path resource [/org/springframework/web/servlet/mvc/view/handler/DefaultHandlerMethodMapping.class] with Root bean: class [null]; scope=abstract=false; lazyInit=false; autowireMode=3; dependencyCheck=0; autodetectCandidate=true; primary=false; factoryBeanName=org.springframework.web.servlet.mvc.annotation.annotation.AnnotationMethodHandlerAdapter; initMethodName=null; destroyMethodName=(inferred); defined in class path resource [org/springframework/boot/context/embedded/webapplicationinitializer/EmbeddedServletInitializer.class]
2016-02-03 15:58:30.448 INFO 38161 --- [main] trationDelegateBeanPostProcessor : Bean 'org.springframework.transaction.annotation.ProxyTransactionAttributeSource' of type [class org.springframework.transaction.annotation.ProxyTransactionAttributeSource] is not eligible for getting processed by all BeanPostProcessors (for example: not eligible for auto-proxying)
2016-02-03 15:58:30.873 INFO 38161 --- [main] s.b.c.e.t.TomcatEmbeddedServletContainer : Tomcat initialized with port(s): 8080 (http)
2016-02-03 15:58:30.885 INFO 38161 --- [main] o.apache.catalina.core.StandardService : Starting service Tomcat
2016-02-03 15:58:30.886 INFO 38161 --- [main] org.apache.catalina.core.StandardEngine : Starting Servlet Engine: Apache Tomcat/8.0.30
2016-02-03 15:58:30.979 INFO 38161 --- [ost-startStop-1] o.a.c.c.C.[Tomcat].[localhost].[/] : Initializing Spring embedded WebApplicationContext
2016-02-03 15:58:30.979 INFO 38161 --- [ost-startStop-1] o.s.web.context.ContextLoader : Root WebApplicationContext: initialization completed in 1585 ms
2016-02-03 15:58:31.254 INFO 38161 --- [ost-startStop-1] o.s.b.c.e.ServletRegistration : Mapping filter: 'dispatcherServlet' to [/]
2016-02-03 15:58:31.257 INFO 38161 --- [ost-startStop-1] o.s.b.c.e.embedded.FilterRegistrationBean : Mapping filter: 'characterEncodingFilter' to [/]
2016-02-03 15:58:31.258 INFO 38161 --- [ost-startStop-1] o.s.b.c.e.embedded.FilterRegistrationBean : Mapping filter: 'hiddenHttpMethodFilter' to [/]
2016-02-03 15:58:31.258 INFO 38161 --- [ost-startStop-1] o.s.b.c.e.embedded.FilterRegistrationBean : Mapping filter: 'httpPutContentFilter' to [/]
2016-02-03 15:58:31.258 INFO 38161 --- [ost-startStop-1] o.s.b.c.e.embedded.FilterRegistrationBean : Mapping filter: 'requestContentTypeFilter' to [/]
2016-02-03 15:58:31.565 INFO 38161 --- [main] o.s.jdbc.datasource.init.ScriptUtils : Executing SQL script from URL [file:/Users/makit/demo/de-mo-web/target/classes/schema.sql]
2016-02-03 15:58:31.576 INFO 38161 --- [main] o.s.jdbc.datasource.init.ScriptUtils : Executed SQL script from URL [file:/Users/makit/demo/de-mo-web/target/classes/schema.sql] in 11 ms.
2016-02-03 15:58:31.623 INFO 38161 --- [main] j.LocalContainerEntityManagerFactoryBean : Building JPA container EntityManagerFactory for persistence unit 'default'
2016-02-03 15:58:31.634 INFO 38161 --- [main] o.hibernate.jpa.internal.util.LogHelper : HHH000204: Processing PersistenceUnitInfo [
    name: default
    ... ]
2016-02-03 15:58:31.697 INFO 38161 --- [main] org.hibernate.Version : HHH000042: Hibernate Version (4.3.11.Final)
2016-02-03 15:58:31.699 INFO 38161 --- [main] org.hibernate.cfg.Environment : HHH000026: Hibernate properties not found
2016-02-03 15:58:31.701 INFO 38161 --- [main] org.hibernate.cfg.Environment : HHH000021: Bytecode provider name: javassist
2016-02-03 15:58:31.883 INFO 38161 --- [main] o.hibernate.annotations.common.Version : HCANN000001: Hibernate Commons Annotations (4.0.5.Final)
2016-02-03 15:58:31.955 INFO 38161 --- [main] org.hibernate.dialect.Dialect : HHH000400: Using dialect: org.hibernate.dialect.H2Dialect
2016-02-03 15:58:32.117 INFO 38161 --- [main] o.h.i.a.st.ASTQueryTranslatorFactory : HHH000397: Using ASTQueryTranslatorFactory
2016-02-03 15:58:32.686 INFO 38161 --- [main] Looking for @ControllerAdvice: org.springframework.boot.context.embedded.AnnotationContextRefreshListener
2016-02-03 15:58:32.682 INFO 38161 --- [main] s.w.s.m.a.RequestMappingHandlerMapping : Mapped "([/{cities},methods[GET]])" onto java.util.ListComposableCity com.example.CityController.getIties()
2016-02-03 15:58:32.663 INFO 38161 --- [main] s.w.s.m.a.RequestMappingHandlerMapping : Mapped "([/{cities},methods[POST]])" onto com.example.City com.example.CityController.postCities(com.example.City)
2016-02-03 15:58:32.665 INFO 38161 --- [main] s.w.s.m.a.RequestMappingHandlerMapping : Mapped "([/{error}])" onto public org.springframework.http.ResponseEntity java.util.Map<String,String>, java.lang.Object>>
2016-02-03 15:58:32.665 INFO 38161 --- [main] s.w.s.m.a.RequestMappingHandlerMapping : Mapped "([/{error}],produces=[text/html])" onto public org.springframework.web.servlet.ModelAndView
2016-02-03 15:58:32.687 INFO 38161 --- [main] o.s.w.s.handler.SimpleUrlHandlerMapping : Mapped URL path [/{websites/**}] onto handler of type [class org.springframework.web.servlet.ResourceHttpRequestHandler]
2016-02-03 15:58:32.687 INFO 38161 --- [main] o.s.w.s.handler.SimpleUrlHandlerMapping : Mapped URL path [/**] onto handler of type [class org.springframework.web.servlet.ResourceHttpRequestHandler]
2016-02-03 15:58:32.715 INFO 38161 --- [main] o.s.w.s.handler.SimpleUrlHandlerMapping : Mapped URL path [/**/favicon.ico] onto handler of type [class org.springframework.web.servlet.ResourceHttpRequestHandler]
2016-02-03 15:58:32.885 INFO 38161 --- [main] o.s.j.e.a.AnnotationMethodProcessing : Registering beans for JMX exposure on startup
2016-02-03 15:58:32.947 INFO 38161 --- [main] s.b.c.e.t.TomcatEmbeddedServletContainer : Tomcat started on port(s): 8080 (http)
2016-02-03 15:58:32.951 INFO 38161 --- [main] com.example.DemoWebApplication : Started DemoWebApplication in 4.188 seconds (JVM running for 4.507)

```

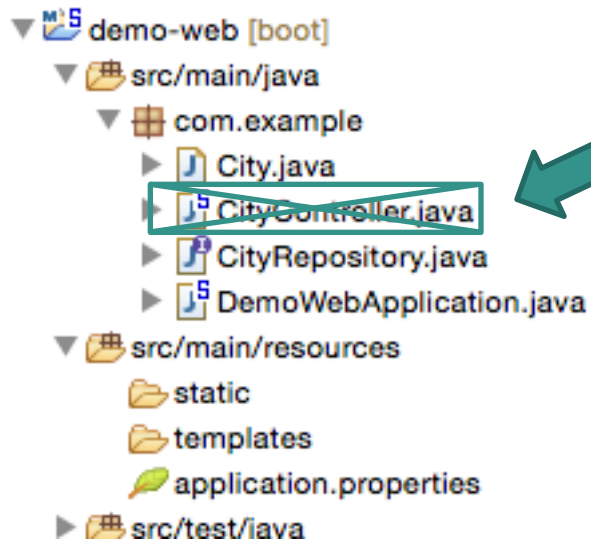
Access API

```
$ curl -X GET http://localhost:8080/cities
[]
$ curl -X POST http://localhost:8080/cities -H "Content-Type:
application/json" -d '{"name":"Tokyo"}'
{"id":1,"name":"Tokyo"}
$ curl -X POST http://localhost:8080/cities -H "Content-Type:
application/json" -d '{"name":"Osaka"}'
{"id":2,"name":"Osaka"}
$ curl -X GET http://localhost:8080/cities
[{"id":1,"name":"Tokyo"}, {"id":2,"name":"Osaka"}]
```

Add Spring Data REST

```
<dependency>  
  <groupId>org.springframework.boot</groupId>  
  <artifactId>spring-boot-starter-data-rest</artifactId>  
</dependency>
```


Delete CityController



No longer needed

Add @RepositoryRestResource

```
package com.example;

import org.springframework.data.jpa.repository.JpaRepository;
import org.springframework.data.rest.core.annotation.RepositoryRestResource;

@RepositoryRestResource
public interface CityRepository extends JpaRepository<City, Integer> {

}
```

Re-Run (03-04)

[illegible]

Spring Boot Actuator

Add Spring Boot Actuator

```
<dependency>  
  <groupId>org.springframework.boot</groupId>  
  <artifactId>spring-boot-starter-actuator</artifactId>  
</dependency>
```

Re-Run

```
2016-02-04 15:32:14.330 INFO 54226 --- [main] o.s.b.a.e.mvc.EndpointHandlerMapping : Mapped "{[/metrics/{name:. *}],methods=[GET],produces=[application/json]}" onto public
java.lang.Object org.springframework.boot.actuate.endpoint.mvc.MetricsMvcEndpoint.value(java.lang.String)
2016-02-04 15:32:14.330 INFO 54226 --- [main] o.s.b.a.e.mvc.EndpointHandlerMapping : Mapped "{[/metrics || /metrics.json],methods=[GET],produces=[application/json]}" onto public
java.lang.Object org.springframework.boot.actuate.endpoint.mvc.EndpointMvcAdapter.invoke()
2016-02-04 15:32:14.331 INFO 54226 --- [main] o.s.b.a.e.mvc.EndpointHandlerMapping : Mapped "{[/beans || /beans.json],methods=[GET],produces=[application/json]}" onto public
java.lang.Object org.springframework.boot.actuate.endpoint.mvc.EndpointMvcAdapter.invoke()
2016-02-04 15:32:14.331 INFO 54226 --- [main] o.s.b.a.e.mvc.EndpointHandlerMapping : Mapped "{[/trace || /trace.json],methods=[GET],produces=[application/json]}" onto public
java.lang.Object org.springframework.boot.actuate.endpoint.mvc.EndpointMvcAdapter.invoke()
2016-02-04 15:32:14.332 INFO 54226 --- [main] o.s.b.a.e.mvc.EndpointHandlerMapping : Mapped "{[/health || /health.json],produces=[application/json]}" onto public java.lang.Object
org.springframework.boot.actuate.endpoint.mvc.HealthMvcEndpoint.invoke(java.security.Principal)
2016-02-04 15:32:14.332 INFO 54226 --- [main] o.s.b.a.e.mvc.EndpointHandlerMapping : Mapped "{[/info || /info.json],methods=[GET],produces=[application/json]}" onto public
java.lang.Object org.springframework.boot.actuate.endpoint.mvc.EndpointMvcAdapter.invoke()
2016-02-04 15:32:14.333 INFO 54226 --- [main] o.s.b.a.e.mvc.EndpointHandlerMapping : Mapped "{[/autoconfig || /autoconfig.json],methods=[GET],produces=[application/json]}" onto
public java.lang.Object org.springframework.boot.actuate.endpoint.mvc.EndpointMvcAdapter.invoke()
2016-02-04 15:32:14.333 INFO 54226 --- [main] o.s.b.a.e.mvc.EndpointHandlerMapping : Mapped "{[/env/{name:. *}],methods=[GET],produces=[application/json]}" onto public
java.lang.Object org.springframework.boot.actuate.endpoint.mvc.EnvironmentMvcEndpoint.value(java.lang.String)
2016-02-04 15:32:14.334 INFO 54226 --- [main] o.s.b.a.e.mvc.EndpointHandlerMapping : Mapped "{[/env || /env.json],methods=[GET],produces=[application/json]}" onto public
java.lang.Object org.springframework.boot.actuate.endpoint.mvc.EndpointMvcAdapter.invoke()
2016-02-04 15:32:14.334 INFO 54226 --- [main] o.s.b.a.e.mvc.EndpointHandlerMapping : Mapped "{[/actuator || /actuator.json],produces=[application/json]}" onto public
org.springframework.hateoas.ResourceSupport org.springframework.boot.actuate.endpoint.mvc.HalJsonMvcEndpoint.links()
2016-02-04 15:32:14.334 INFO 54226 --- [main] o.s.b.a.e.mvc.EndpointHandlerMapping : Mapped "{[/dump || /dump.json],methods=[GET],produces=[application/json]}" onto public
java.lang.Object org.springframework.boot.actuate.endpoint.mvc.EndpointMvcAdapter.invoke()
2016-02-04 15:32:14.335 INFO 54226 --- [main] o.s.b.a.e.mvc.EndpointHandlerMapping : Mapped "{[/configprops || /configprops.json],methods=[GET],produces=[application/json]}" onto
public java.lang.Object org.springframework.boot.actuate.endpoint.mvc.EndpointMvcAdapter.invoke()
2016-02-04 15:32:14.335 INFO 54226 --- [main] o.s.b.a.e.mvc.EndpointHandlerMapping : Mapped "{[/mappings || /mappings.json],methods=[GET],produces=[application/json]}" onto public
java.lang.Object org.springframework.boot.actuate.endpoint.mvc.EndpointMvcAdapter.invoke()
```

Push to Cloud Foundr

```
$ mvn clean package -Dmaven.test.skip=true  
$ cf push my-second-cf -p target/demo-web-0.0.1-SNAPSHOT.jar
```

Pivotal

Transforming How The World Builds Software