What is Microservice?

- Aime -

Today's Contents

- What is Microservice
- Benefits and Drawbacks
- Spring vs Microservice
- Getting Started with Spring framework and Microservice
- Example - Order Microservice System by Spring Framework

What is Microservice

> a particular way of designing software applications as suites of independently deployable services.

- http://martinfowler.com

> **microservices** is a software architecture style in which complex applications are composed of small, independent processes communicating with each other using language-agnostic APIs.

\- Wikipedia

“

Micro-services are not 1 million services that make up a single service.

Micro-services are also not many large services each covering a bunch of functionality and interacting via databases or an ESB in a large enterprise system

micro-services are not necessarily independently deployable

Instead of focusing on the services being independently deployable, it is sufficient to choose groups of services that can be deployed independently.

”

- David, http://davidmorgantini.blogspot.kr/

What is Microservice ?

Characteristic of "MicroService"

small scope

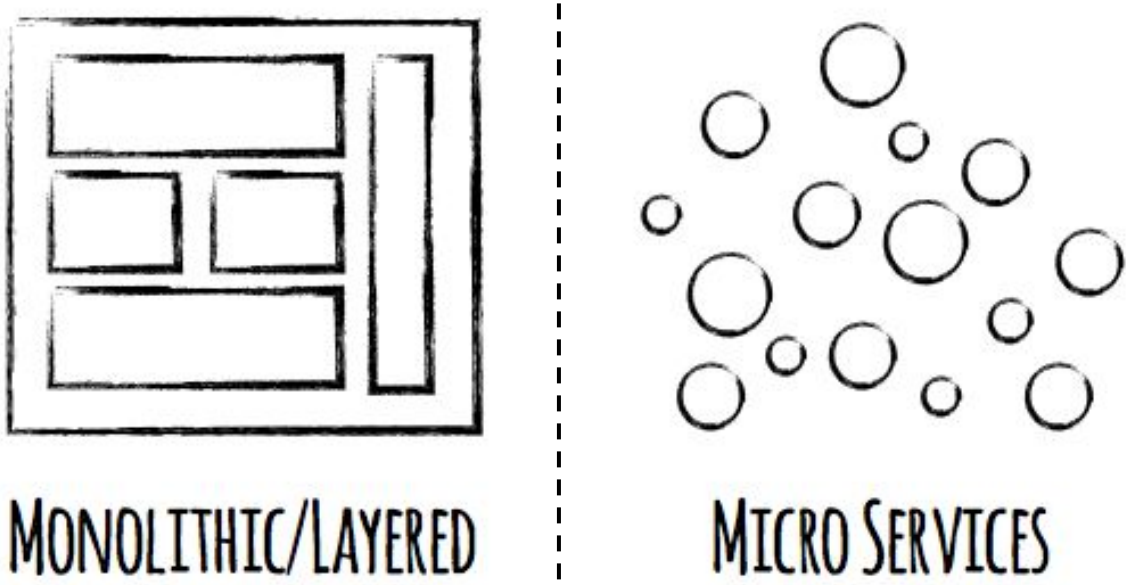
standalone

can integrate with other service via interface

(should) have it own database

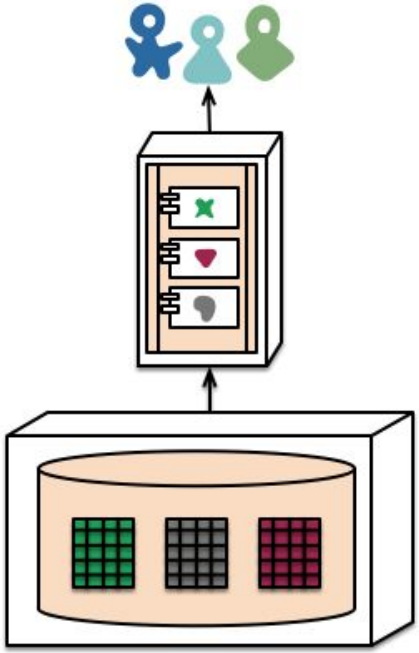
Difference between

Monolithic & Microservice

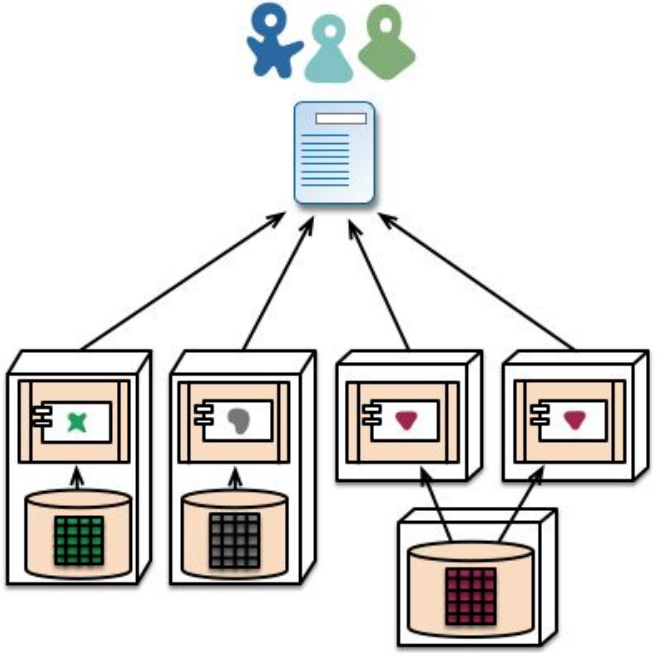


Difference between “Monolithic” and “microservice” - Concept

picture from eugenedvorkin.com



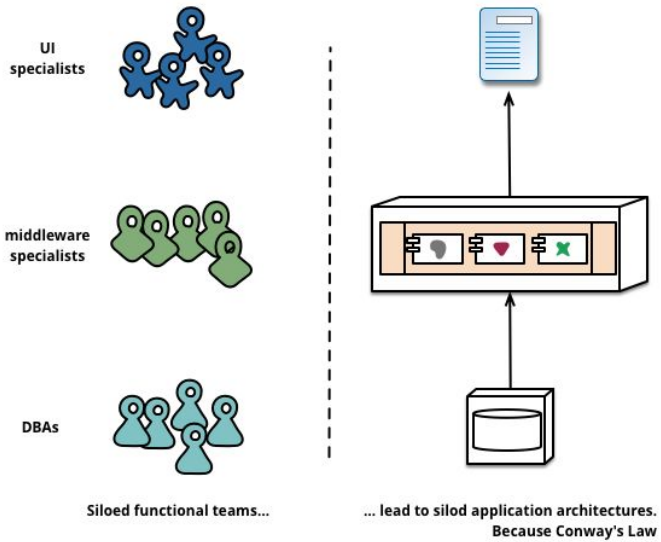
monolith - single database

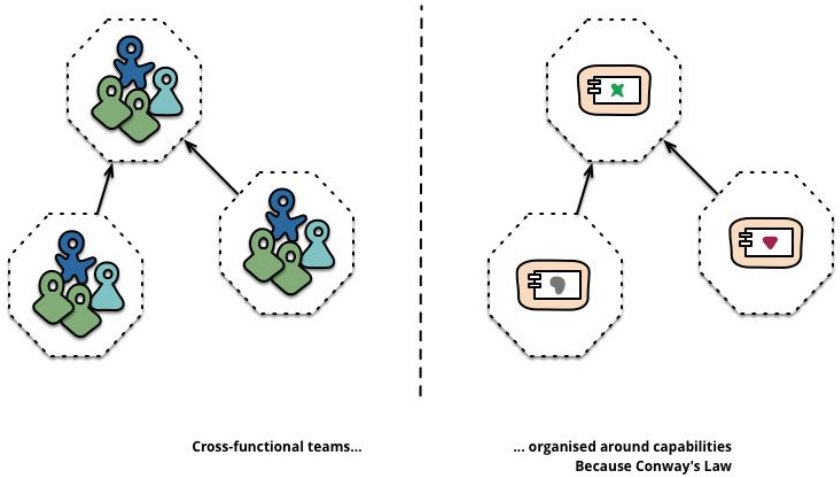


microservices - application databases

Difference between "Layered Architecture" and "microservice" - architecture

picture from martinfowler.com





Difference between "Layered Architecture" and "microservice" - development

picture from martinfowler.com

Benefits of Microservice

Benefits of "MicroService"

- Independent
- Speed up deployment
- Easy to Understand
- Easier to scale
- More Productive
- Improve fault isolation

DRAWBACKS ...

Drawbacks ...

Developer has to deal with developing distributed system

Tool Support

More Difficult on Testing

Use Cases

Inter-Service Communication Mechanism

Memory Consumption

Communication between teams

Nowaday...

SPRING vs MICROSERVICE

spring

https://spring.io/tools

SPRING TOOL SUITE™

The Spring Tool Suite is an Eclipse-based development environment that is customized for developing Spring applications. It provides a ready-to-use environment to implement, debug, run, and deploy your Spring applications, including integrations for Pivotal tc Server, Pivotal Cloud Foundry, Git, Maven, AspectJ, and more.

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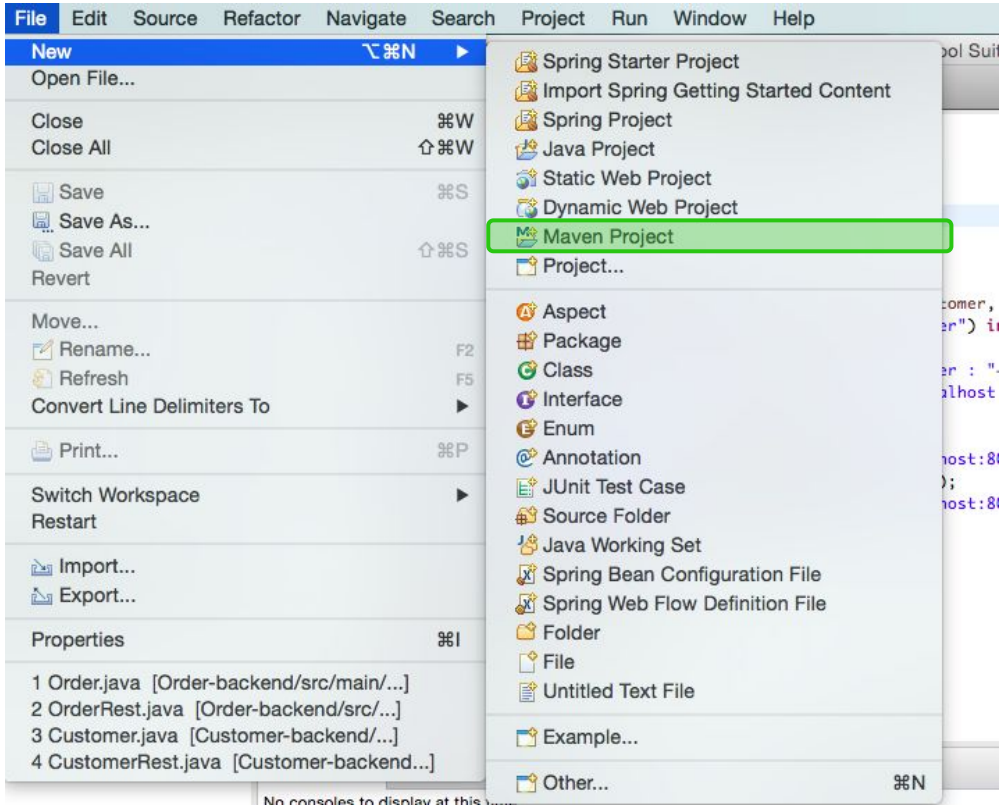
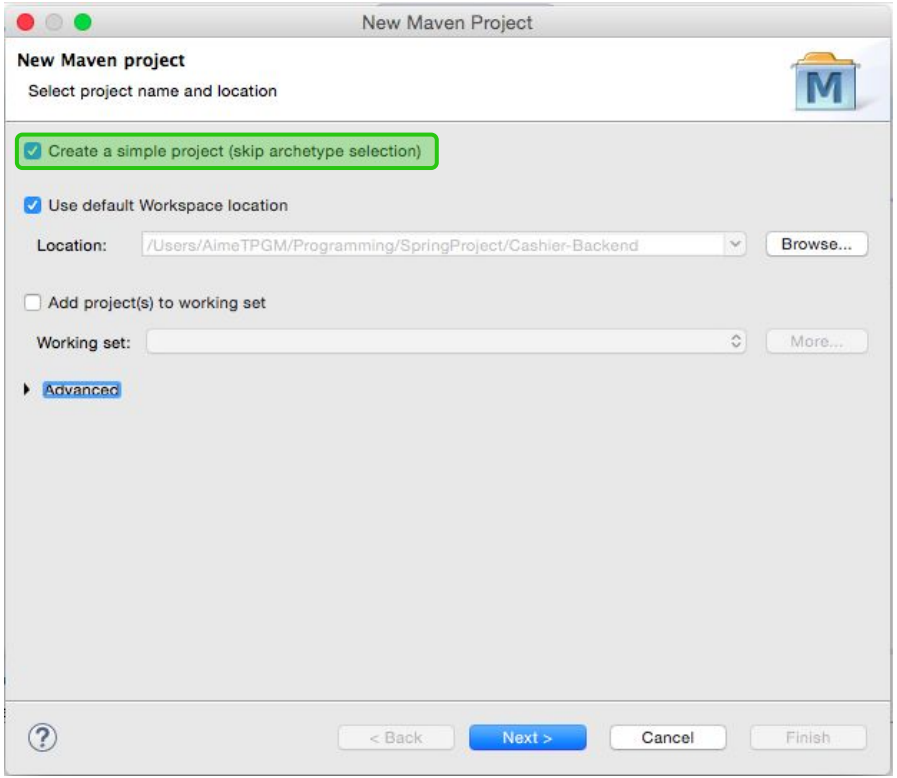
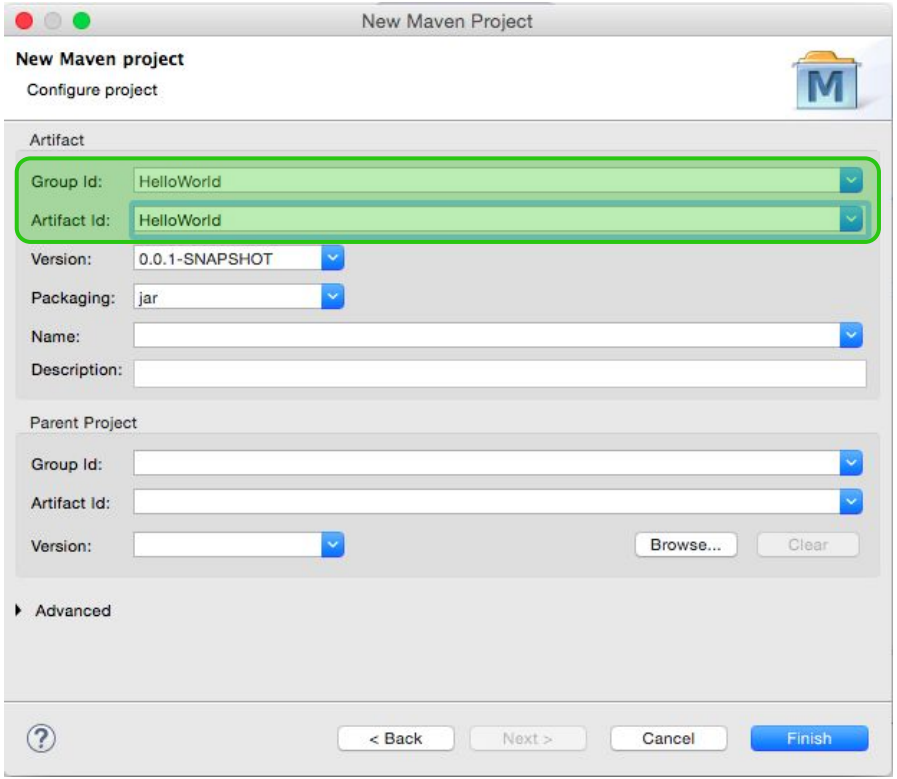
Getting Started

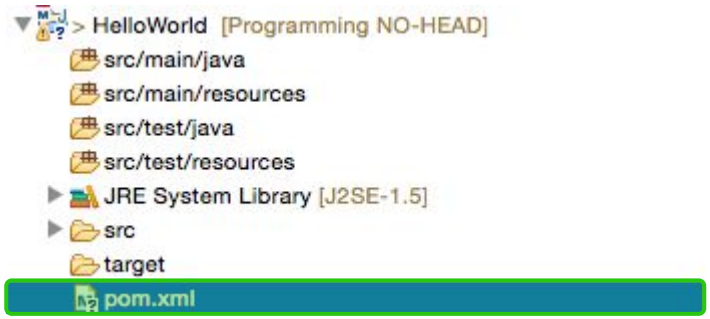


File > New > Maven Project





Check “Skip archetype selection” > Next > Enter Group id and Artifact id > Finish



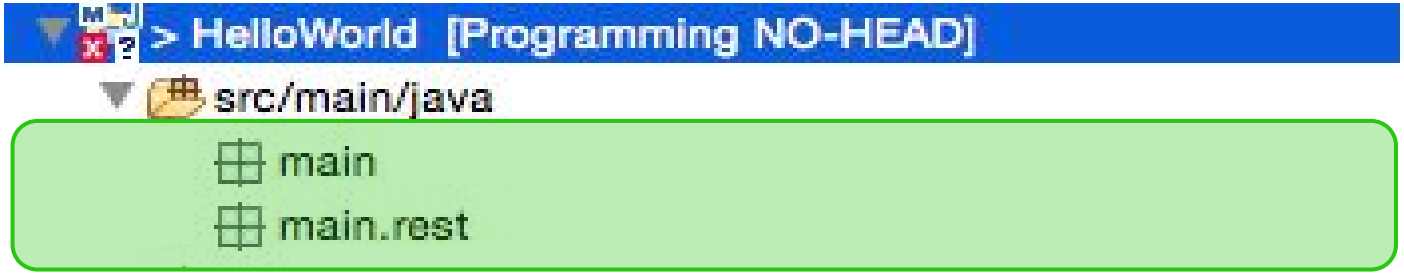
HelloWorld/pom.xml

```
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi=
  <modelVersion>4.0.0</modelVersion>
  <groupId>HelloWorld</groupId>
  <artifactId>HelloWorld</artifactId>
  <version>0.0.1-SNAPSHOT</version>
  <parent>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-parent</artifactId>
    <version>1.2.5.RELEASE</version>
  </parent>
  <dependencies>
    <dependency>
        <groupId>org.springframework.boot</groupId>
        <artifactId>spring-boot-starter-web</artifactId>
    </dependency>
    <dependency>
        <groupId>org.springframework.boot</groupId>
        <artifactId>spring-boot-starter-jersey</artifactId>
    </dependency>
  </dependencies>
</project>
```

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

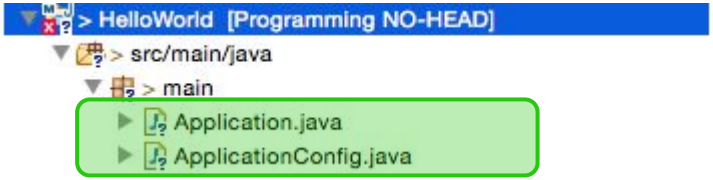
Open “pom.xml” > Add <parent> and each <dependency>

- to make a microservice, it needs to add spring-boot dependency



“main” is for storing main(), identifying Spring, Configuration
“main.rest” is for making RESTful WS, API, other components

Create “main” and “main.rest” packages under src/main/java




```java
package main;

import org.springframework.boot.SpringApplication;

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

}
```

```java
package main;

import javax.inject.Named;

@Configuration
public class ApplicationConfig {
    @Named
    static class JerseyConfig extends ResourceConfig{
        public JerseyConfig(){
            this.packages("main.rest");
        }
    }

}
```

"Application" contains main() and Defines Spring boot
"ApplicationConfig" contains Jersey configuration

Create "Application" and "ApplicationConfig" class under src/main/java/main

HelloWorld.java | HelloWorldRest.java

```
package main.rest;

public class HelloWorld {

    private String hello;

    public String getHello(){
        return hello;
    }

    public void setHello(String name){
        hello = "Hello"+name;
    }

}
```

HelloWorld.java | *HelloWorldRest.java

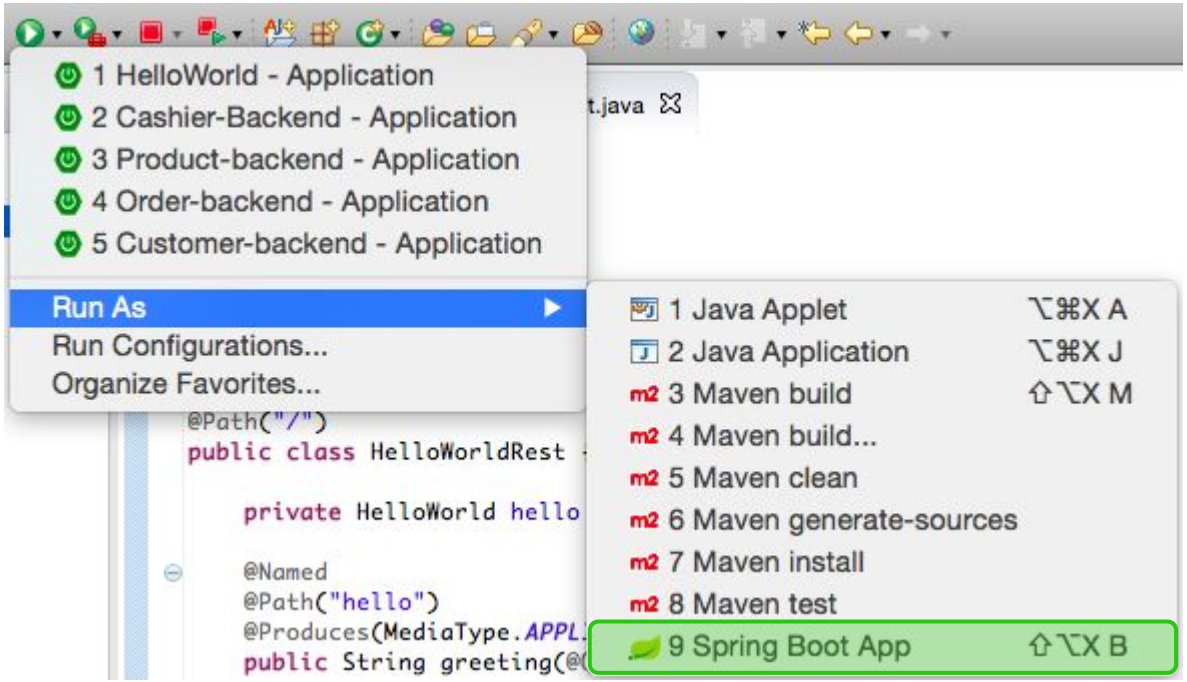
```
package main.rest;

import javax.inject.Named;
import javax.ws.rs.GET;
import javax.ws.rs.Path;
import javax.ws.rs.Produces;
import javax.ws.rs.QueryParam;
import javax.ws.rs.core.MediaType;

@Named
@Path("/")
public class HelloWorldRest {

    private HelloWorld hello = new HelloWorld();

    @GET
    @Path("hello")
    @Produces(MediaType.APPLICATION_JSON)
    public String greeting(@QueryParam("name") String name ){
        hello.setHello(name);
        return hello.getHello();
    }

}
```

“Hello” contains application model

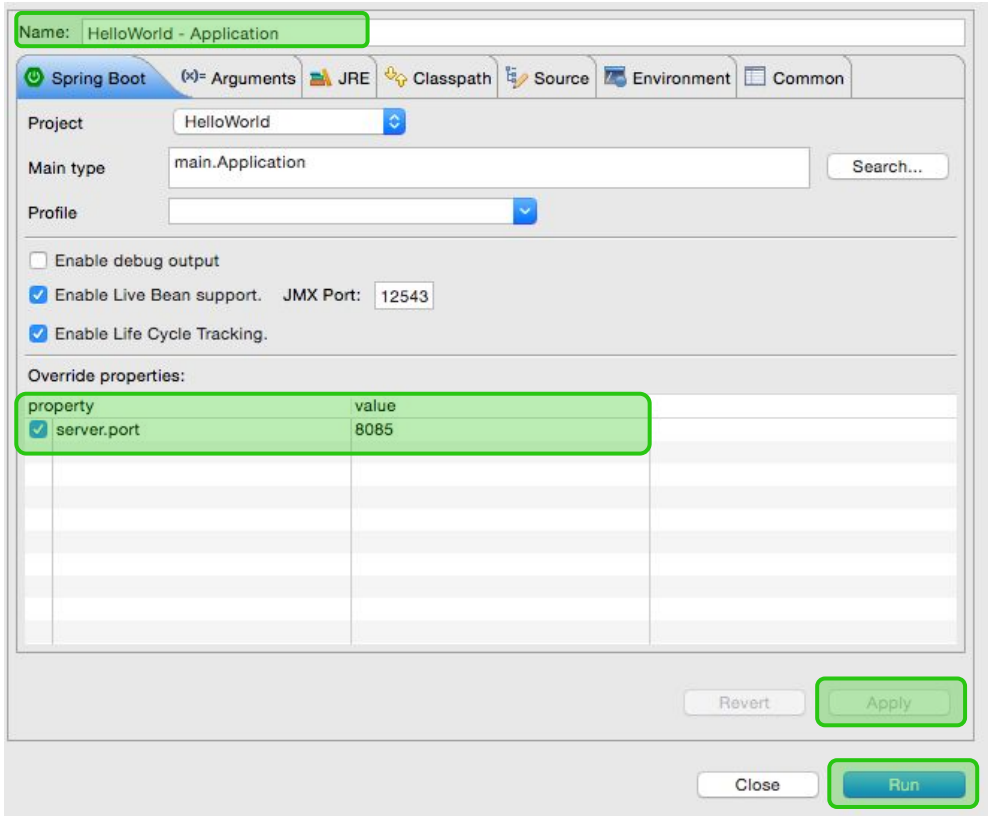
“HelloWorldRest” provides API

* you can move “Hello” to other package, i.e., main.model, as well if needed

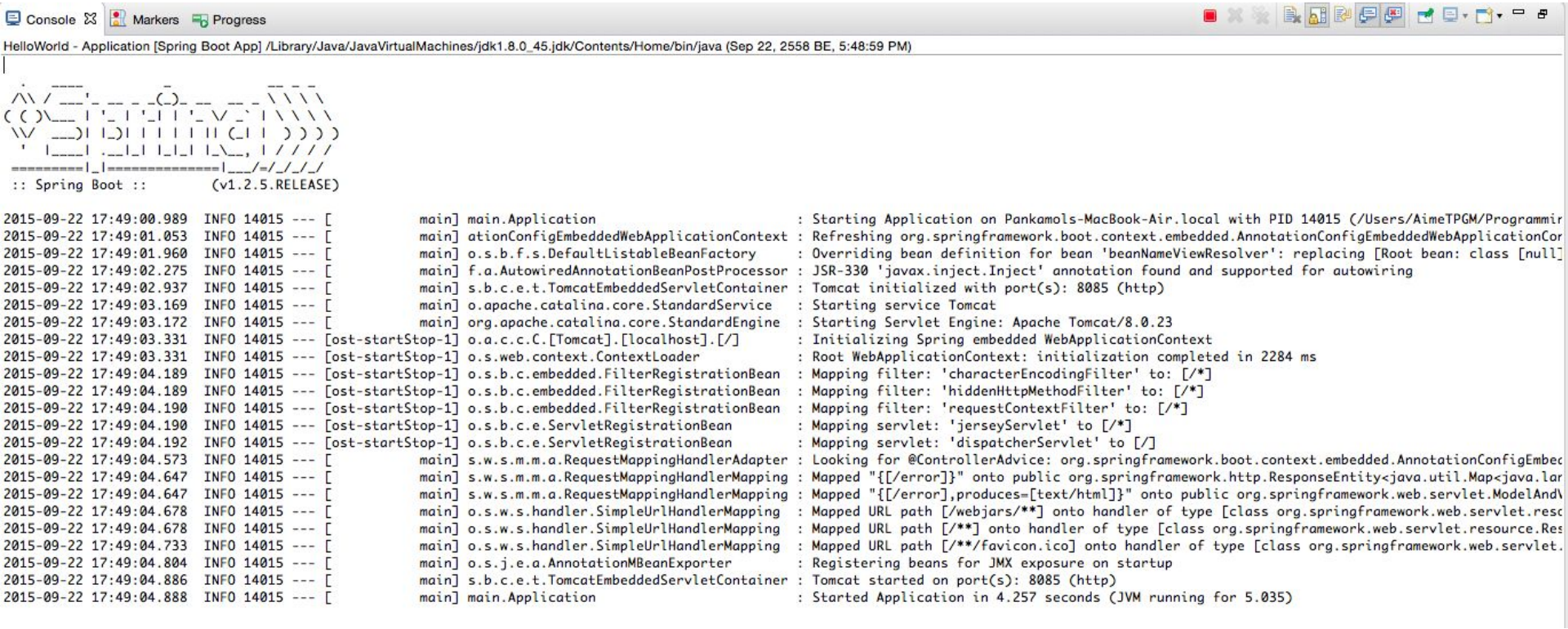
Create “HelloWorld” and “HelloWorldRest” class under src/main/java/main/rest



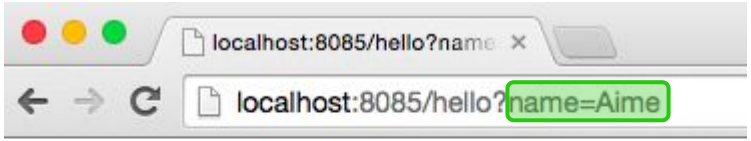
Run as Spring Boot App



Run Configuration ...


Console
Markers
Progress
HelloWorld - Application [Spring Boot App] /Library/Java/JavaVirtualMachines/jdk1.8.0_45.jdk/Contents/Home/bin/java (Sep 22, 2558 BE, 5:48:59 PM)
:: Spring Boot :: (v1.2.5.RELEASE)
2015-09-22 17:49:00.989 INFO 14015 --- [main] main.Application : Starting Application on Pankamols-MacBook-Air.local with PID 14015 (/Users/AimeTPGM/Programmir
2015-09-22 17:49:01.053 INFO 14015 --- [main] ationConfigEmbeddedWebApplicationContext : Refreshing org.springframework.boot.context.embedded.AnnotationConfigEmbeddedWebApplicationCor
2015-09-22 17:49:01.960 INFO 14015 --- [main] o.s.b.f.s.DefaultListableBeanFactory : Overriding bean definition for bean 'beanNameViewResolver': replacing [Root bean: class [null]
2015-09-22 17:49:02.275 INFO 14015 --- [main] f.a.AutowiredAnnotationBeanPostProcessor : JSR-330 'javax.inject.Inject' annotation found and supported for autowiring
2015-09-22 17:49:02.937 INFO 14015 --- [main] s.b.c.e.t.TomcatEmbeddedServletContainer : Tomcat initialized with port(s): 8085 (http)
2015-09-22 17:49:03.169 INFO 14015 --- [main] o.apache.catalina.core.StandardService : Starting service Tomcat
2015-09-22 17:49:03.172 INFO 14015 --- [main] org.apache.catalina.core.StandardEngine : Starting Servlet Engine: Apache Tomcat/8.0.23
2015-09-22 17:49:03.331 INFO 14015 --- [ost-startStop-1] o.a.c.c.C.[Tomcat].[localhost].[/] : Initializing Spring embedded WebApplicationContext
2015-09-22 17:49:03.331 INFO 14015 --- [ost-startStop-1] o.s.web.context.ContextLoader : Root WebApplicationContext: initialization completed in 2284 ms
2015-09-22 17:49:04.189 INFO 14015 --- [ost-startStop-1] o.s.b.c.embedded.FilterRegistrationBean : Mapping filter: 'characterEncodingFilter' to: [/*]
2015-09-22 17:49:04.189 INFO 14015 --- [ost-startStop-1] o.s.b.c.embedded.FilterRegistrationBean : Mapping filter: 'hiddenHttpMethodFilter' to: [/*]
2015-09-22 17:49:04.190 INFO 14015 --- [ost-startStop-1] o.s.b.c.embedded.FilterRegistrationBean : Mapping filter: 'requestContextFilter' to: [/*]
2015-09-22 17:49:04.190 INFO 14015 --- [ost-startStop-1] o.s.b.c.e.ServletRegistrationBean : Mapping servlet: 'jerseyServlet' to [/*]
2015-09-22 17:49:04.192 INFO 14015 --- [ost-startStop-1] o.s.b.c.e.ServletRegistrationBean : Mapping servlet: 'dispatcherServlet' to [/]
2015-09-22 17:49:04.573 INFO 14015 --- [main] s.w.s.m.m.a.RequestMappingHandlerAdapter : Looking for @ControllerAdvice: org.springframework.boot.context.embedded.AnnotationConfigEmbed
2015-09-22 17:49:04.647 INFO 14015 --- [main] s.w.s.m.m.a.RequestMappingHandlerMapping : Mapped "{[/error]}" onto public org.springframework.http.ResponseEntity<java.util.Map<java.lar
2015-09-22 17:49:04.647 INFO 14015 --- [main] s.w.s.m.m.a.RequestMappingHandlerMapping : Mapped "{[/error],produces=[text/html]}" onto public org.springframework.web.servlet.ModelAndV
2015-09-22 17:49:04.678 INFO 14015 --- [main] o.s.w.s.handler.SimpleUrlHandlerMapping : Mapped URL path [/webjars/**] onto handler of type [class org.springframework.web.servlet.resc
2015-09-22 17:49:04.678 INFO 14015 --- [main] o.s.w.s.handler.SimpleUrlHandlerMapping : Mapped URL path [/**] onto handler of type [class org.springframework.web.servlet.resource.Res
2015-09-22 17:49:04.733 INFO 14015 --- [main] o.s.w.s.handler.SimpleUrlHandlerMapping : Mapped URL path [/**/favicon.ico] onto handler of type [class org.springframework.web.servlet.
2015-09-22 17:49:04.804 INFO 14015 --- [main] o.s.j.e.a.AnnotationMBeanExporter : Registering beans for JMX exposure on startup
2015-09-22 17:49:04.886 INFO 14015 --- [main] s.b.c.e.t.TomcatEmbeddedServletContainer : Tomcat started on port(s): 8085 (http)
2015-09-22 17:49:04.888 INFO 14015 --- [main] main.Application : Started Application in 4.257 seconds (JVM running for 5.035)

On Console



HelloWorld.java | *HelloWorldRest.java

```
package main.rest;

import javax.inject.Named;
import javax.ws.rs.GET;
import javax.ws.rs.Path;
import javax.ws.rs.Produces;
import javax.ws.rs.QueryParam;
import javax.ws.rs.core.MediaType;

@Named
@Path("/")
public class HelloWorldRest {

    private HelloWorld hello = new HelloWorld();

    @GET
    @Path("hello")
    @Produces(MediaType.APPLICATION_JSON)
    public String greeting(@QueryParam("name") String name ){
        hello.setHello(name);
        return hello.getHello();
    }

}
```

HelloWorld.java | HelloWorldRest.java

```
package main.rest;

public class HelloWorld {

    private String hello;

    public String getHello(){
        return hello;
    }

    public void setHello(String name){
        hello = "Hello"+name;
    }

}
```

GET Request

Microservice Example