

Server Side APIs: Part 1 Tutorial

In this tutorial, you'll work on an application that uses Tech Elevator Locations as the data model. In this locations application, you'll create an API that allows others to get a list of locations, as well as the ability to add new ones.

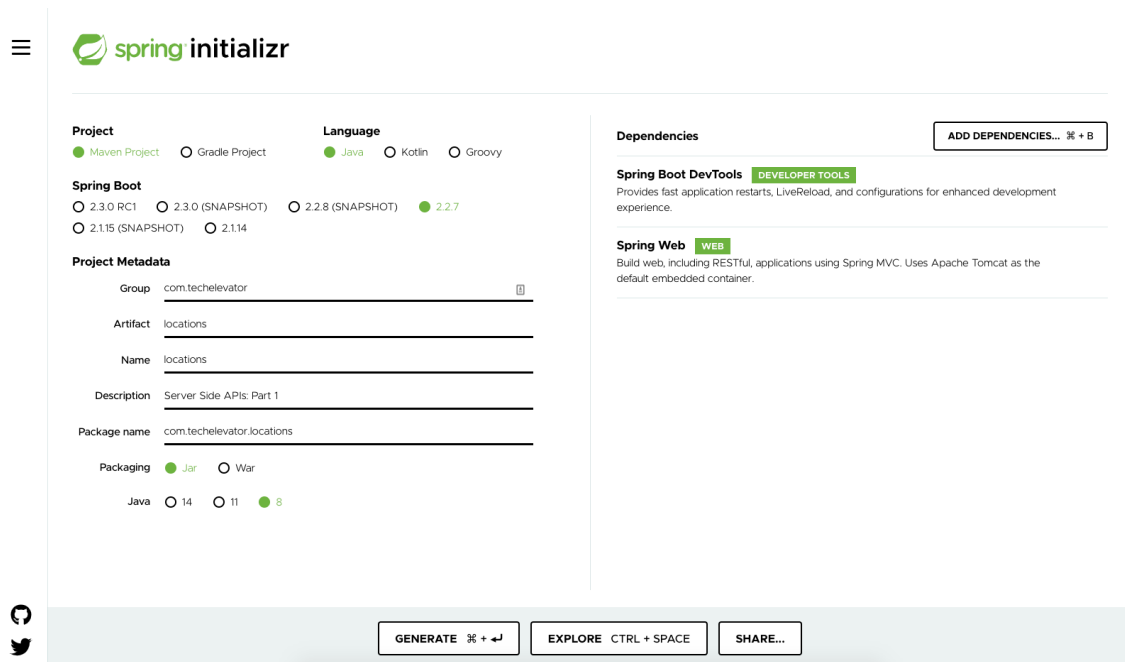
Step One: Create, import, and run a new project

In this section of the tutorial, you'll create a new project, import it into Eclipse, and run it.

1. Bootstrap your application

The first thing to do is create a new project. You'll use the [Spring Initializr](#) to bootstrap your application. Be sure that your project configuration matches the following:

- Project: Maven Project
- Language: Java
- Spring Boot: Latest Stable Version (2.2.7)
- Group: com.techelevator
- Artifact: locations
- Dependencies: Spring Web Starter, Validation, Spring Boot Devtools

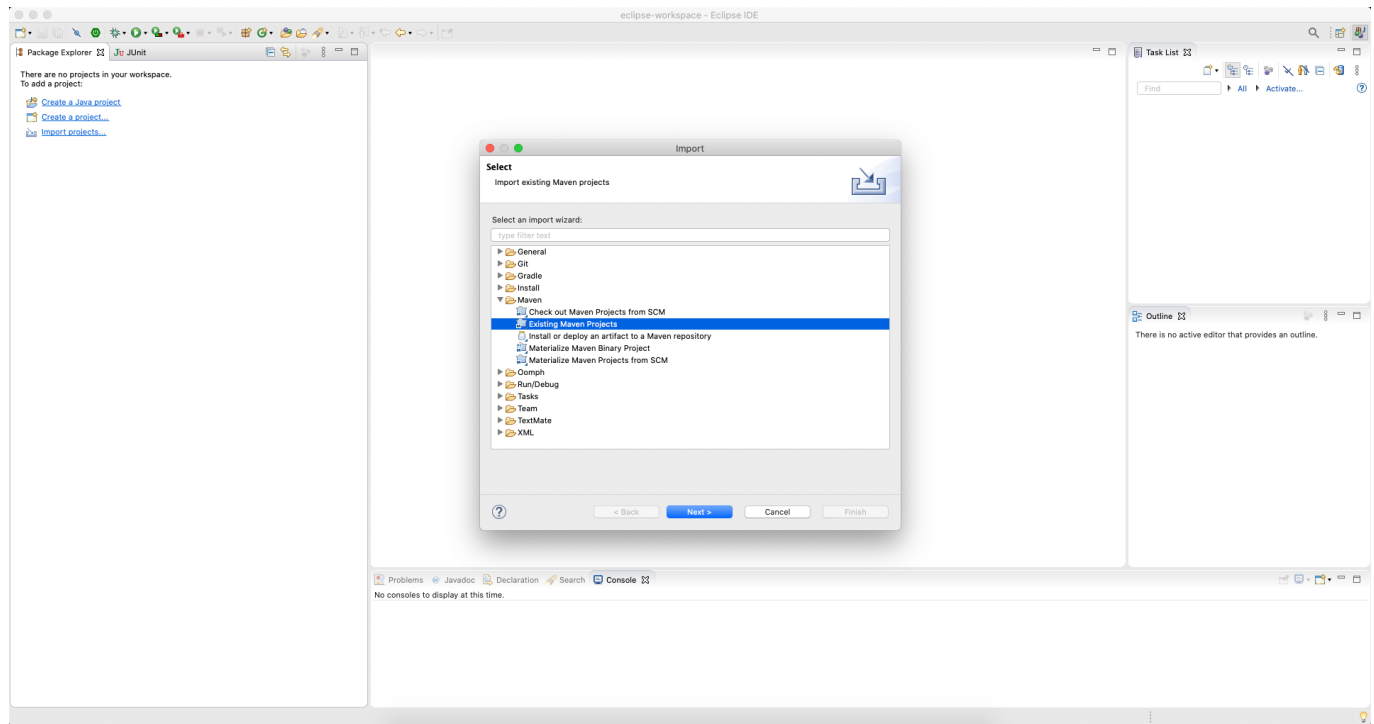


The screenshot shows the Spring Initializr web interface. The 'Project' section has 'Maven Project' selected. The 'Language' section has 'Java' selected. The 'Spring Boot' section has '2.2.7' selected. The 'Project Metadata' section has 'Group' as 'com.techelevator', 'Artifact' as 'locations', 'Name' as 'locations', 'Description' as 'Server Side APIs: Part 1', and 'Package name' as 'com.techelevator.locations'. The 'Packaging' section has 'Jar' selected. The 'Dependencies' section has 'Spring Boot DevTools' and 'Spring Web' selected. At the bottom, there are buttons for 'GENERATE', 'EXPLORE', and 'SHARE...'. The 'GENERATE' button has a keyboard shortcut of '⌘ + ↵'.

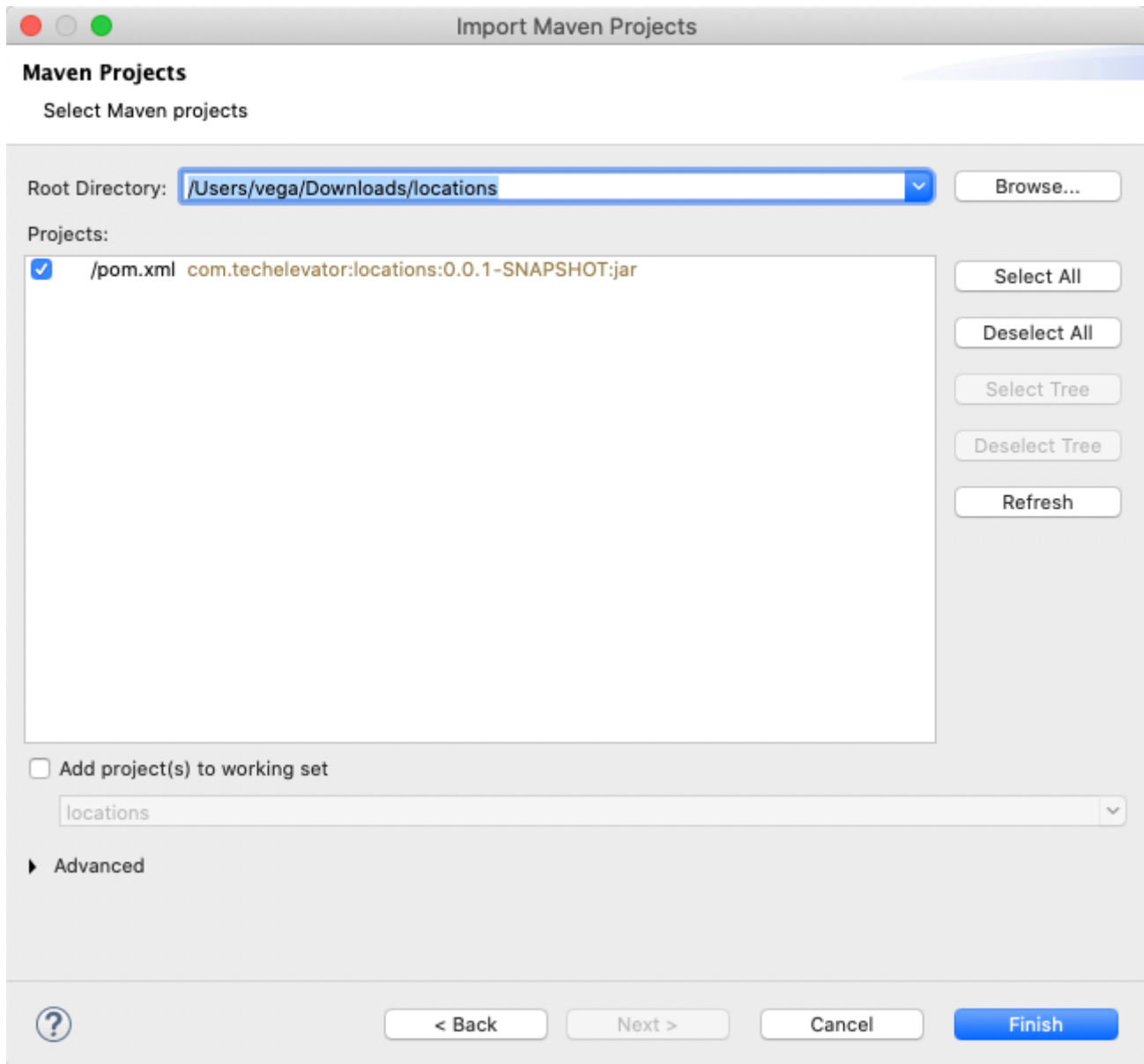
When you click **Generate Project**, it creates a zip file and begins downloading to your computer. When the download is complete, extract the zip file to a location on your hard drive where you want to keep the project.

2. Import project into Eclipse

Next, you need to import the project into Eclipse. To do so, open Eclipse and select **File > Import > Maven > Existing Maven Projects**.



To import your project, click into the **locations** folder, and select **Open**. This takes you to the "Select Maven Projects" screen and by default, the **pom.xml** file is selected.

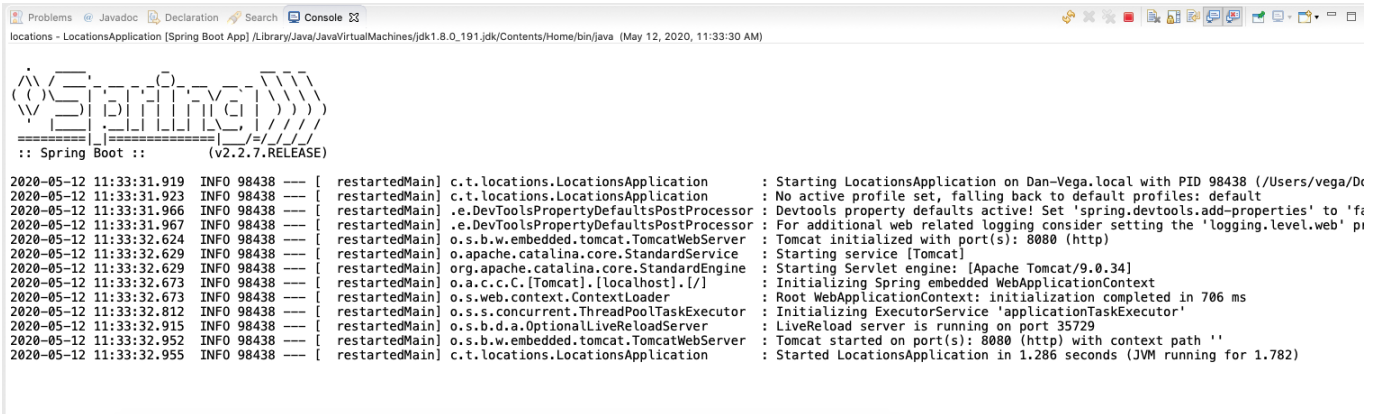


After that, click "Finish" to import your project.

3. Run your project

Now that you've set up your project in Eclipse, run it to make sure everything works. It's best to make sure the application runs before adding anything new to it.

Navigate to `src/main/java/com/techelevator/locations` right-click on the `LocationsApplication.java` and select `Run As > Java Application`. Some logging appears in the Console. The last line tells you that the application has started.



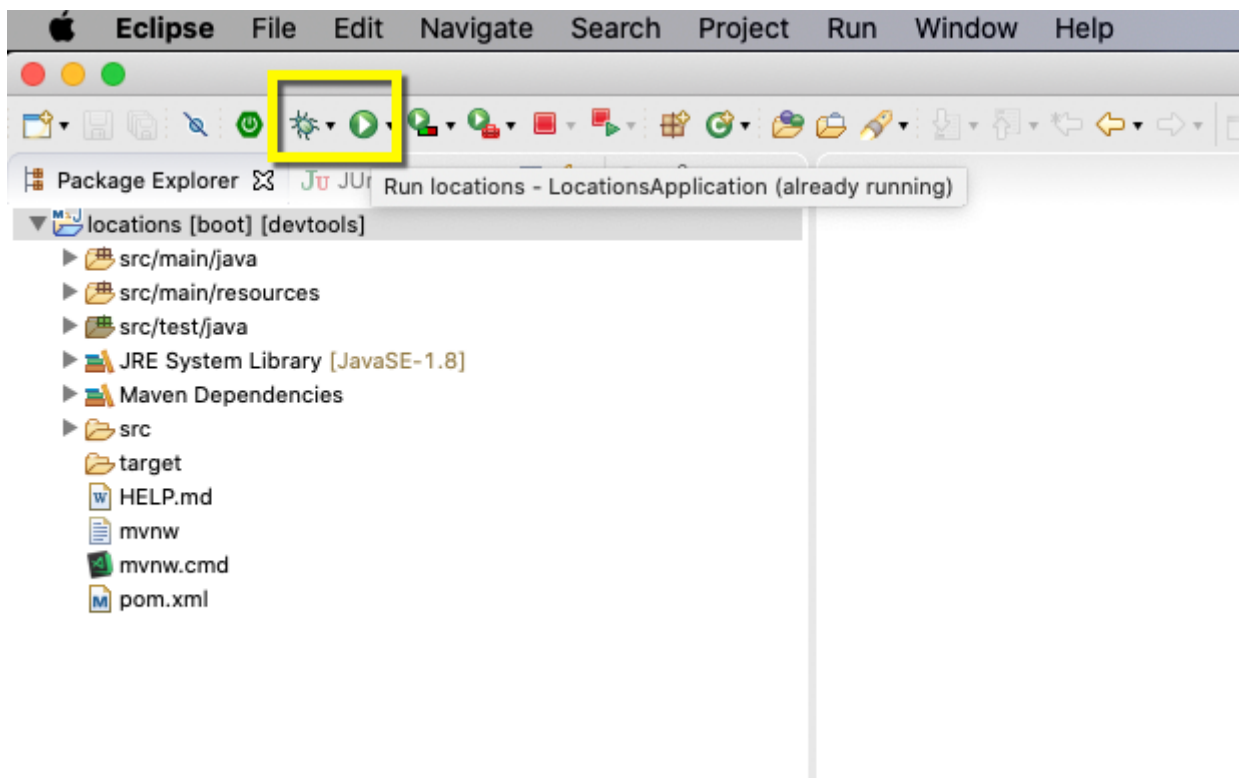
```

:: Spring Boot :: (v2.2.7.RELEASE)

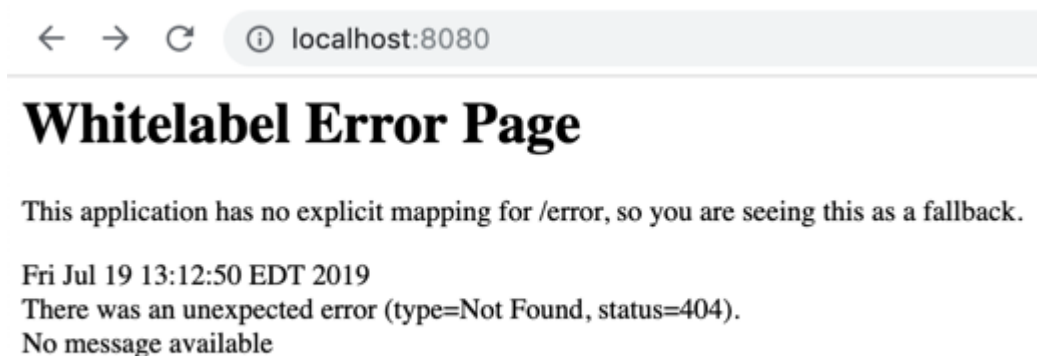
2020-05-12 11:33:31.919 INFO 98438 --- [ restartedMain] c.t.locations.LocationsApplication : Starting LocationsApplication on Dan-Vega.local with PID 98438 (/Users/vega/D
2020-05-12 11:33:31.923 INFO 98438 --- [ restartedMain] c.t.locations.LocationsApplication : No active profile set, falling back to default profiles: default
2020-05-12 11:33:31.966 INFO 98438 --- [ restartedMain] .e.DevToolsPropertyDefaultsPostProcessor : Devtools property defaults active! Set 'spring.devtools.add-properties' to 'fi
2020-05-12 11:33:31.967 INFO 98438 --- [ restartedMain] .e.DevToolsPropertyDefaultsPostProcessor : For additional web related logging consider setting the 'logging.level.web' pi
2020-05-12 11:33:32.624 INFO 98438 --- [ restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat initialized with port(s): 8080 (http)
2020-05-12 11:33:32.629 INFO 98438 --- [ restartedMain] o.apache.catalina.core.StandardService : Starting service [Tomcat]
2020-05-12 11:33:32.629 INFO 98438 --- [ restartedMain] org.apache.catalina.core.StandardEngine : Starting Servlet engine: [Apache Tomcat/9.0.34]
2020-05-12 11:33:32.673 INFO 98438 --- [ restartedMain] o.a.c.c.C.[Tomcat].[localhost].[/] : Initializing Spring embedded WebApplicationContext
2020-05-12 11:33:32.673 INFO 98438 --- [ restartedMain] o.s.web.context.ContextLoader : Root WebApplicationContext: initialization completed in 706 ms
2020-05-12 11:33:32.812 INFO 98438 --- [ restartedMain] o.s.s.concurrent.ThreadPoolTaskExecutor : Initializing ExecutorService 'applicationTaskExecutor'
2020-05-12 11:33:32.915 INFO 98438 --- [ restartedMain] o.s.b.d.a.OptionalLiveReloadServer : LiveReload server is running on port 35729
2020-05-12 11:33:32.952 INFO 98438 --- [ restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat started on port(s): 8080 (http) with context path ''
2020-05-12 11:33:32.955 INFO 98438 --- [ restartedMain] c.t.locations.LocationsApplication : Started LocationsApplication in 1.286 seconds (JVM running for 1.782)

```

You can also run and debug your application by using the icons in your toolbar.



If you open a browser window and visit <http://localhost:8080>, you'll see a screen that looks like this:



Do you know why this error page appears? If you answered, "because there is no route set up for the root context `/`", you're correct. If you try to visit a route that doesn't have a Request Mapping defined, this error page appears by default.

Step Two: Create the Location controller

Your application is running, but it doesn't do anything yet. This is because you haven't defined any routes or actions to take when someone visits that route. Routes are entry ways into your application, and they're defined inside of a controller.

Before creating any controllers, create a new package called `controllers` inside of your main package `com.techelevator.locations`. This is where your controllers live.

In your new controllers package, create a new class called `LocationController.java`:

```
package com.techelevator.locations.controllers;

public class LocationController {

}
```

Next, use the `@RestController` annotation to tell the Spring Framework that this class is a REST Controller class:

```
package com.techelevator.locations.controllers;

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

@RestController
public class LocationController {

}
```

Step Three: Create a Location model

Like most applications, you need data to make it interesting. This could come from many different places like a local file, a database, or even another API. In this tutorial, you'll store the data in a `List<>`.

In the previous command line application, the Location model had the following properties:

- id
- name
- address
- city
- state
- zip

Now that you know what properties make up your model, you need to create one. To get started, create a new package called `models` where your models live.

In that package, create a class called `Location.java` and paste in the following code:

```
package com.techelevator.locations.models;

public class Location {

    private int id;
    private String name;
    private String address;
    private String city;
    private String state;
    private String zip;

    public Location() {
    }

    public Location(int id, String name, String address, String city, String
state, String zip) {
        this.id = id;
        this.name = name;
        this.address = address;
        this.city = city;
        this.state = state;
        this.zip = zip;
    }

    public int getId() {
        return id;
    }

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

    public String getName() {
        return name;
    }

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

    public String getAddress() {
        return address;
    }

    public void setAddress(String address) {
        this.address = address;
    }

    public String getCity() {
        return city;
    }

    public void setCity(String city) {
```

```
        this.city = city;
    }

    public String getState() {
        return state;
    }

    public void setState(String state) {
        this.state = state;
    }

    public String getZip() {
        return zip;
    }

    public void setZip(String zip) {
        this.zip = zip;
    }

    @Override
    public String toString() {
        return "Location [id=" + id + ", name=" + name + "]";
    }
}
```

Java is verbose when it comes to Plain old Java Objects (POJOs), but thankfully, you don't have to type all of that code. If you're creating your own Model, type out the properties and then use the IDE to generate Constructors, Getters, Setters, and toString() methods.

With your model in place, you can set up some initial data to expose in your API:

```
@RestController
public class LocationController {

    private List<Location> locations = new ArrayList<>();

    public LocationController() {
        locations.add(new Location(1,
            "Tech Elevator Cleveland",
            "7100 Euclid Ave #14",
            "Cleveland",
            "OH",
            "44103"));
        locations.add(new Location(2,
            "Tech Elevator Columbus",
            "1275 Kinnear Rd #121",
            "Columbus",
            "OH",
            "43212"));
        locations.add(new Location(3,
            "Tech Elevator Cincinnati",
```

```
        "1776 Mentor Ave Suite 355",
        "Cincinnati",
        "OH",
        "45212"));
locations.add(new Location(4,
    "Tech Elevator Pittsburgh",
    "901 Pennsylvania Ave #3",
    "Pittsburgh",
    "PA",
    "15233"));
locations.add(new Location(5,
    "Tech Elevator Detroit",
    "440 Burroughs St #316",
    "Detroit",
    "MI",
    "48202"));
locations.add(new Location(6,
    "Tech Elevator Philadelphia",
    "30 S 17th St",
    "Philadelphia",
    "PA",
    "19103"));
    }
}
```

Step Four: Get a list of locations

Now you've set up a basic controller, a model that represents a location, and some initial data. The first method you'll expose in your API is a way to get a list of all the locations.

To do so, you'll set up a `RequestMapping` for `/locations`. This method returns the list of locations, and thanks to Spring, it's converted to an array of JSON objects:

```
@RequestMapping( path = "/locations", method = RequestMethod.GET)
public List<Location> list() {
    return locations;
}
```

You can visit <http://localhost:8080/locations> using the browser, since this is a GET request, or you can use Postman. You'll get a list of locations in JSON format:

```
[
  {
    id: 1,
    name: 'Tech Elevator Cleveland',
    address: '7100 Euclid Ave #14',
    city: 'Cleveland',
    state: 'OH',
```



```
    zip: '44103',
  },
  {
    id: 2,
    name: 'Tech Elevator Columbus',
    address: '1275 Kinnear Rd #121',
    city: 'Columbus',
    state: 'OH',
    zip: '43212',
  },
  {
    id: 3,
    name: 'Tech Elevator Cincinnati',
    address: '1776 Mentor Ave Suite 355',
    city: 'Cincinnati',
    state: 'OH',
    zip: '45212',
  },
  {
    id: 4,
    name: 'Tech Elevator Pittsburgh',
    address: '901 Pennsylvania Ave #3',
    city: 'Pittsburgh',
    state: 'PA',
    zip: '15233',
  },
  {
    id: 5,
    name: 'Tech Elevator Detroit',
    address: '440 Burroughs St #316',
    city: 'Detroit',
    state: 'MI',
    zip: '48202',
  },
  {
    id: 6,
    name: 'Tech Elevator Philadelphia',
    address: '30 S 17th St',
    city: 'Philadelphia',
    state: 'PA',
    zip: '19103',
  },
];
```

Step Five: Add a location

You know how to get a list of the locations; now, you need to add a location. The path for this is still `/locations`, which is the same path as the previous one.

The only difference is the request method that this method accepts, `RequestMethod.POST`. This allows you to have the same path for similar resources, which are usually grouped within the same controller.

To define the method, use the `RequestMethod` POST:

```
@RequestMapping( value = "/locations", method = RequestMethod.POST)
public Location add(@RequestBody Location location) {
    if( location != null ) {
        locations.add(location);
        return location;
    }
    return null;
}
```

Unlike the GET example, you can't visit the POST `/locations` in the browser. If you try to, the browser runs a GET operation and you're returned the list of locations.

You need to open Postman, and send a POST request to `/locations`. Make sure to set the `Content-Type` header to `application/json`, or set the body format to "raw" and "JSON".

In the body of the request, enter the following JSON content that sends a new location:

```
{
  "id": 7,
  "name": "Tech Elevator Hawaii",
  "address": "1234 Kalia Rd",
  "city": "Honolulu",
  "state": "HI",
  "zip": "96815"
}
```

If you followed the instructions correctly, you'll see a status code of 200 after you hit "Send."

The screenshot shows a REST client interface with the following details:

- Method:** POST
- URL:** http://localhost:8080/locations
- Send Button:** A blue button labeled "Send".
- Params:** None
- Authorization:** None
- Headers (10):** No headers are visible.
- Body:** A JSON object:

```
{  "id": 7,  "name": "Tech Elevator Hawaii",  "address": "1234 Kalia Rd",  "city": "Honolulu",  "state": "HI",  "zip": "96815"}
```
- Pre-request Script:** None
- Tests:** None
- Settings:** None
- Response:** Status: 200 OK, Time: 27 ms, Size: 291 B
- Response Body:** A JSON object:

```
{  "id": 7,  "name": "Tech Elevator Hawaii",  "address": "1234 Kalia Rd",  "city": "Honolulu",  "state": "HI",  "zip": "96815"}
```

If you run another GET on `/locations`, you'll see your new location added to the list:

```
[  {    id: 1,    name: 'Tech Elevator Cleveland',    address: '7100 Euclid Ave #14',    city: 'Cleveland',    state: 'OH',    zip: '44103',  },  {    id: 2,    name: 'Tech Elevator Columbus',    address: '1275 Kinnear Rd #121',    city: 'Columbus',    state: 'OH',    zip: '43212',  },  {    id: 3,    name: 'Tech Elevator Cincinnati',    address: '1776 Mentor Ave Suite 355',    city: 'Cincinnati',    state: 'OH',    zip: '45212',  },]
```

```
{
  id: 4,
  name: 'Tech Elevator Pittsburgh',
  address: '901 Pennsylvania Ave #3',
  city: 'Pittsburgh',
  state: 'PA',
  zip: '15233',
},
{
  id: 5,
  name: 'Tech Elevator Detroit',
  address: '440 Burroughs St #316',
  city: 'Detroit',
  state: 'MI',
  zip: '48202',
},
{
  id: 6,
  name: 'Tech Elevator Philadelphia',
  address: '30 S 17th St',
  city: 'Philadelphia',
  state: 'PA',
  zip: '19103',
},
{
  id: 7,
  name: 'Tech Elevator Hawaii',
  address: '1234 Kalia Rd',
  city: 'Honolulu',
  state: 'HI',
  zip: '96815',
},
];
```

Step Six: Return a Random location

You've been tasked with creating one additional route in your API:

- Random
 - path: /locations/random
 - return: a random Location from the list of locations

Try to work on the problem by yourself before you move on and see what the solution might look like.

Solution

This is what your controller looks like when you've completed the tutorial:

```
package com.techelevator.locations.controllers;

import com.techelevator.locations.models.Location;
```

```
import org.springframework.web.bind.annotation.RequestBody;
import org.springframework.web.bind.annotation.RequestMapping;
import org.springframework.web.bind.annotation.RequestMethod;
import org.springframework.web.bind.annotation.RestController;

import java.util.ArrayList;
import java.util.List;
import java.util.Random;

@RestController
public class LocationController {

    private List<Location> locations = new ArrayList<>();

    public LocationController() {
        locations.add(new Location(1,
            "Tech Elevator Cleveland",
            "7100 Euclid Ave #14",
            "Cleveland",
            "OH",
            "44103"));
        locations.add(new Location(2,
            "Tech Elevator Columbus",
            "1275 Kinnear Rd #121",
            "Columbus",
            "OH",
            "43212"));
        locations.add(new Location(3,
            "Tech Elevator Cincinnati",
            "1776 Mentor Ave Suite 355",
            "Cincinnati",
            "OH",
            "45212"));
        locations.add(new Location(4,
            "Tech Elevator Pittsburgh",
            "901 Pennsylvania Ave #3",
            "Pittsburgh",
            "PA",
            "15233"));
        locations.add(new Location(5,
            "Tech Elevator Detroit",
            "440 Burroughs St #316",
            "Detroit",
            "MI",
            "48202"));
        locations.add(new Location(6,
            "Tech Elevator Philadelphia",
            "30 S 17th St",
            "Philadelphia",
            "PA",
            "19103"));
    }

    @RequestMapping( path = "/locations", method = RequestMethod.GET )
```

```
public List<Location> list() {  
    return locations;  
}  
  
@RequestMapping( value = "/locations", method = RequestMethod.POST)  
public Location add(@RequestBody Location location) {  
    if( location != null ) {  
        locations.add(location);  
        return location;  
    }  
    return null;  
}  
  
@RequestMapping( path = "/locations/random", method = RequestMethod.GET )  
public Location random() {  
    return locations.get(new Random().nextInt(locations.size()));  
}  
  
}
```

Summary

In this tutorial, you learned:

- How to create a new Spring Boot application using the Spring Initializr
- How to create a Rest Controller
- How to create Request Mappings to respond to requests
- How to test your API in Postman