Lab JPA: Spring Data

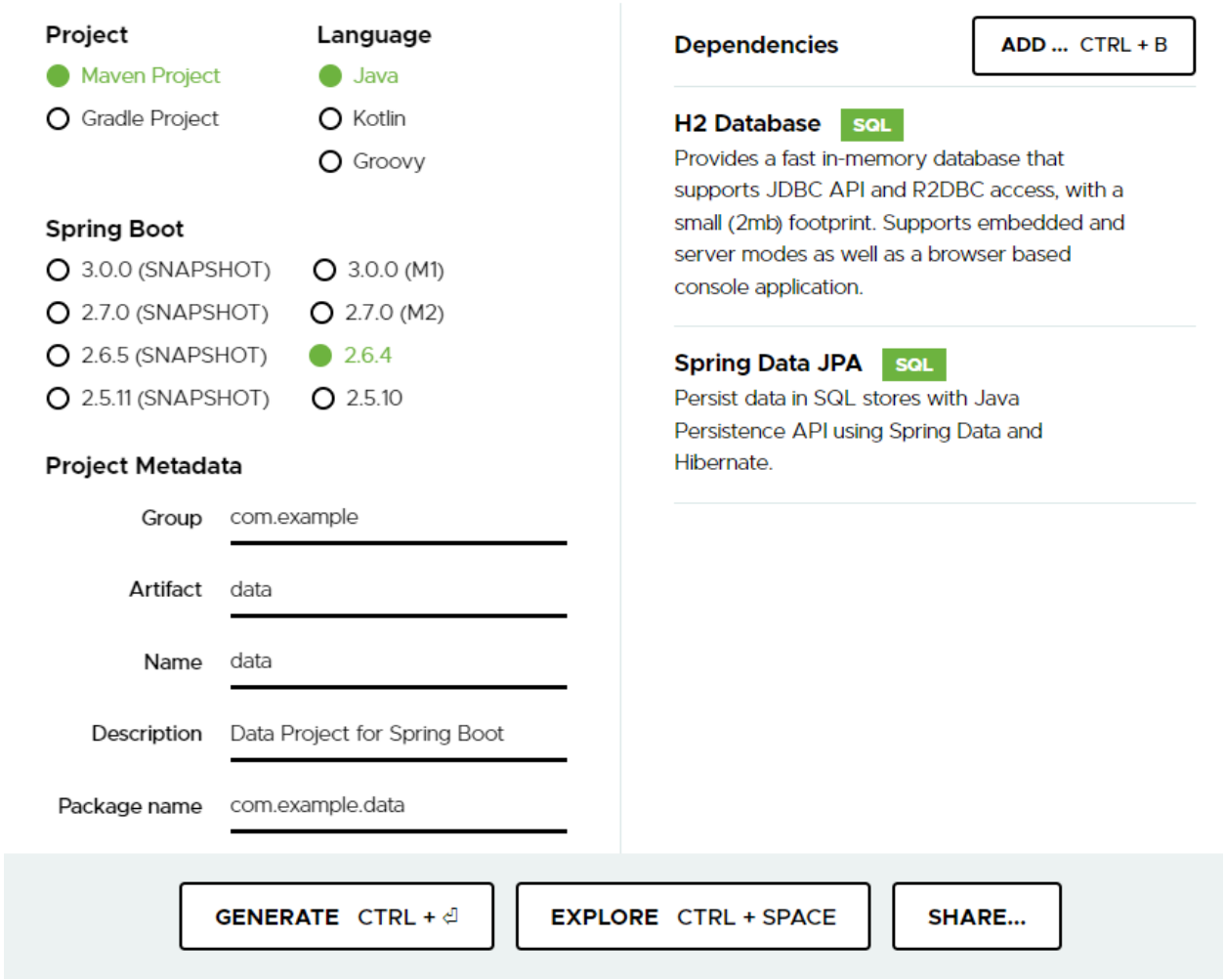
Objectives

In this lab, you will use Spring Data to implement a basic entity type.

Instructions

Step 1 Create the Spring Boot project

1. Go to https://start.spring.io.
2. We will be using the Spring data started and use an in-memory database called H2



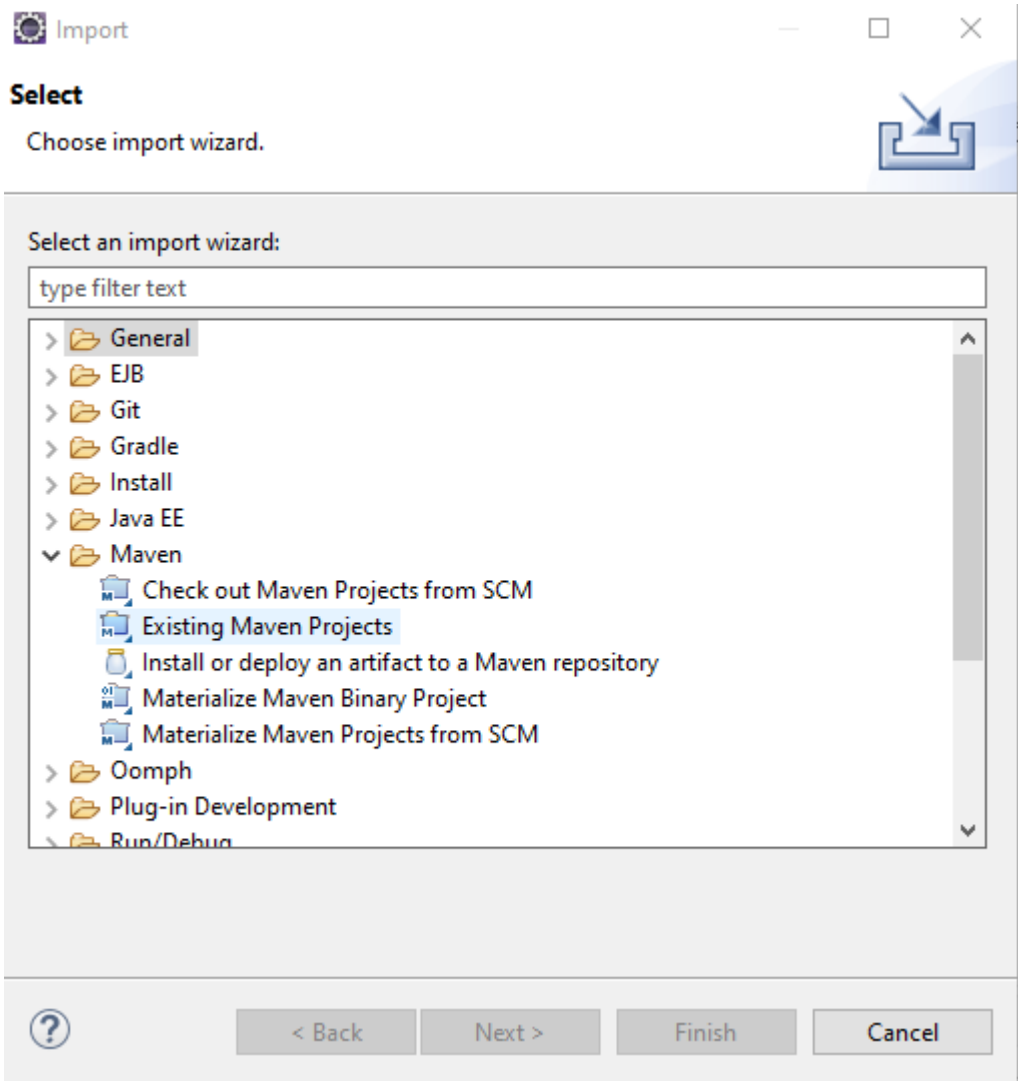
Step 2: Ensure Maven is installed

1. Check to see Maven is installed by opening a command window and executing “mvn -version. You should see the following

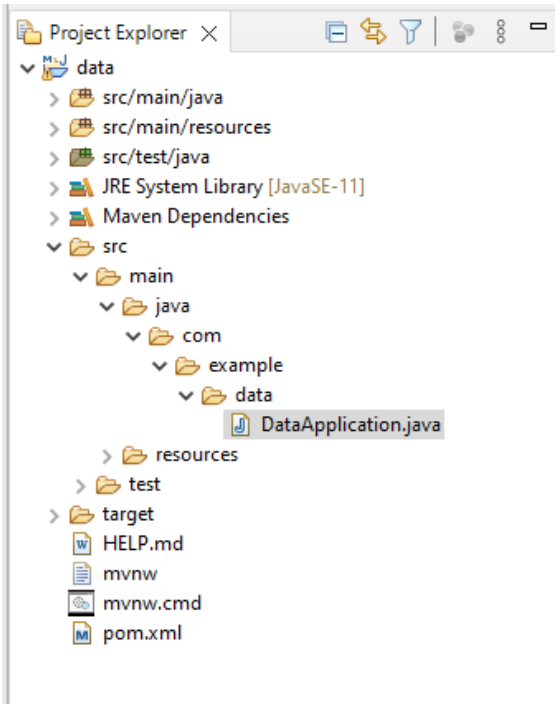
```
C:\Users\micro>mvn -version
Apache Maven 3.8.4 (9b656c72d54e5bacbed989b64718c159fe39b537)
Maven home: C:\tools\apache-maven-3.8.4
Java version: 17.0.2, vendor: Oracle Corporation, runtime: C:\tools\java\jdk-17.0.2
Default locale: en_CA, platform encoding: Cp1252
OS name: "windows 10", version: "10.0", arch: "amd64", family: "windows"
```

Step 3: Create the project

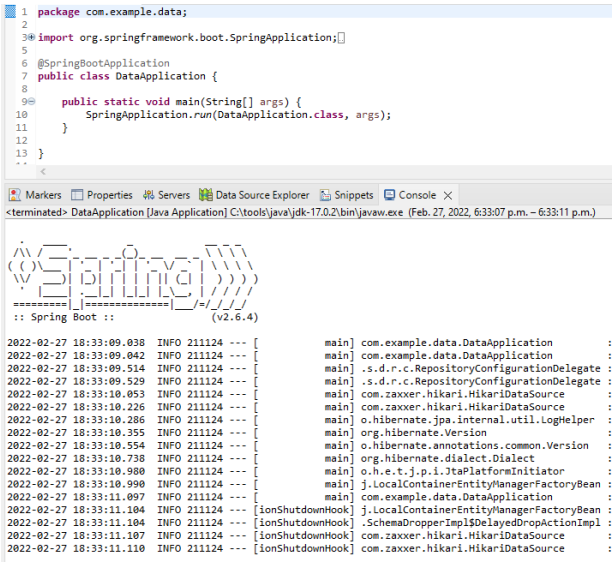
1. Create a new eclipse workspace
2. Use the file import option to import the unzipped director as a Maven project.



3. One the project has been imported; Maven will build all the dependencies. This may take a while but eventually your project should look like this.



4. Run the DataApplication.java main() method as a Java Application to ensure that everything is working.



Step 3: Create the Customer entity class and fields

1. Ensure that you are in the Java Perspective.
2. The code so far does nothing because all we have is a hibernate framework and no actual data
3. The entity to be persisted is a Customer object that has an ID which will serve as the primary key in the underlying database; and first and last name string fields.
4. Implement a Customer class as follows:

```
@Entity
public class Customer {

	@Id
	@GeneratedValue(strategy=GenerationType.AUTO)
	private Long id;
	private String firstName;
	private String lastName;
}
```

5. The @Entity annotation indicates that Customer is a persistent entity
6. If the table that Customer is mapped to is not named Customer, there would be an additional @Table annotation that would specify the table name
7. The @Id Annotation on the id field indicates it is the primary key and that it will be auto-generated.

Step 4: Create the constructors

1. JPA needs a constructor of no args which is protected.
2. The other constructor creates a Customer object populated with data
3. The toString() method give you a nice way to print out a customer

```
protected Customer() {}

public Customer(String firstName, String lastName) {
  this.firstName = firstName;
  this.lastName = lastName;
}

@Override
public String toString() {
  return String.format(
      "Customer[id=%d, firstName='%s', lastName='%s']",
      id, firstName, lastName);
}
```

Sept 5: Create the getters

1. Finally, add the get methods for the data fields

```
public Long getId() {
  return id;
}

public String getFirstName() {
  return firstName;
}

public String getLastName() {
  return lastName;
}
```

Step 6: Create a Repository Interface

1. Create a new Interface that extends the standard CRUD repository Interface
2. This new interface adds two new methods to the repository interface
3. The first looks up a Customer by id. It returns a single Customer object since the id is a primary key.
4. The second returns a list of all customers with the same last name.
5. The Spring JAP will then write the implementation of these methods using Hibernate when the application is run.

```
public interface CustomerRepository extends CrudRepository<Customer, Long> {

      List<Customer> findByLastName(String lastName);
      Customer findById(long id);
    }
```

Step 7: Adding to the Runner class

1. The CommandLineRunner class takes a repository as an argument.
2. It returns a series of commands to be executed by the Spring Boot application.
3. The first set of methods create a few Customer objects and writes them into the H2 database

```
@Bean
  public CommandLineRunner demo(CustomerRepository repository) {
    return (args) -> {
      // save a few customers
      repository.save(new Customer("Jack", "Bauer"));
      repository.save(new Customer("Chloe", "O'Brian"));
      repository.save(new Customer("Kim", "Bauer"));
      repository.save(new Customer("David", "Palmer"));
      repository.save(new Customer("Michelle", "Dessler"));
```

4. The findAll() lists the contents of the Customer table. This is a method inherited from the CRUD repository interface.

```
// fetch all customers
System.out.println("Customers found with findAll():");
System.out.println("-------------------------------");
for (Customer customer : repository.findAll()) {
    System.out.println(customer.toString());
}
```

5. And the methods defined in the CustomerRepository are also usable.

```
// fetch an individual customer by ID
Customer customer = repository.findById(1L);
System.out.println("Customer found with findById(1L):");
System.out.println("--------------------------------");
System.out.println(customer.toString());
System.out.println("");

// fetch customers by last name
System.out.println("Customer found with findByLastName('Bauer'):");
System.out.println("--------------------------------------------");
repository.findByLastName("Bauer").forEach(bauer → {
    System.out.println(bauer.toString());
});
```

The output is shown on the next page.

```
  .   ____          _            __ _ _
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 \\/  ___)| |_)| | | | | || (_| |  ) ) ) )
  '  |____| .__|_| |_|_| |_\__, | / / / /
 =========|_|==============|___/=/_/_/_/
 :: Spring Boot ::                (v2.6.4)

2022-02-27 19:15:45.552  INFO 275116 --- [           main] com.example.data.DataApplication
2022-02-27 19:15:45.554  INFO 275116 --- [           main] com.example.data.DataApplication
2022-02-27 19:15:46.041  INFO 275116 --- [           main] .s.d.r.c.RepositoryConfigurationDelegate
2022-02-27 19:15:46.088  INFO 275116 --- [           main] .s.d.r.c.RepositoryConfigurationDelegate
2022-02-27 19:15:46.626  INFO 275116 --- [           main] com.zaxxer.hikari.HikariDataSource
2022-02-27 19:15:46.801  INFO 275116 --- [           main] com.zaxxer.hikari.HikariDataSource
2022-02-27 19:15:46.885  INFO 275116 --- [           main] o.hibernate.jpa.internal.util.LogHelper
2022-02-27 19:15:46.979  INFO 275116 --- [           main] org.hibernate.Version
2022-02-27 19:15:47.169  INFO 275116 --- [           main] o.hibernate.annotations.common.Version
2022-02-27 19:15:47.332  INFO 275116 --- [           main] org.hibernate.dialect.Dialect
2022-02-27 19:15:47.906  INFO 275116 --- [           main] o.h.e.t.j.p.i.JtaPlatformInitiator
2022-02-27 19:15:47.915  INFO 275116 --- [           main] j.LocalContainerEntityManagerFactoryBean
2022-02-27 19:15:48.386  INFO 275116 --- [           main] com.example.data.DataApplication
Customers found with findAll():
-------------------------------
Customer[id=1, firstName='Jack', lastName='Bauer']
Customer[id=2, firstName='Chloe', lastName='O'Brian']
Customer[id=3, firstName='Kim', lastName='Bauer']
Customer[id=4, firstName='David', lastName='Palmer']
Customer[id=5, firstName='Michelle', lastName='Dessler']
Customer found with findById(1L):
-------------------------------
Customer[id=1, firstName='Jack', lastName='Bauer']

Customer found with findByLastName('Bauer'):
--------------------------------------------
Customer[id=1, firstName='Jack', lastName='Bauer']
Customer[id=3, firstName='Kim', lastName='Bauer']
```