What is Dependency Injection:

Dependency Injection is the main functionality provided by Spring IOC(Inversion of Control). The Spring-Core module is responsible for injecting dependencies through either Constructor or Setter methods. The design principle of Inversion of Control emphasizes keeping the Java classes independent of each other and the container frees them from object creation and maintenance. These classes, managed by Spring, must adhere to the standard definition of Java-Bean. Dependency Injection in Spring also ensures loose-coupling between the classes.

Constructor based Dependancy Injection:-

Constructor-based DI is accomplished by the container invoking a constructor with a number of arguments, each representing a dependency. Calling a static factory method with specific arguments to construct the bean is nearly equivalent, and this discussion treats arguments to a constructor and to a static factory method similarly. The following example shows a class that can only be dependency-injected with constructor injection. Notice that there is nothing special about this class, it is a POJO that has no dependencies on container specific interfaces, base classes or annotations.

Address.java

```
package com.example.demo;
public class Address {
	private String city;
	private String state;
	private String country;
	public Address(String city,String state,String country)
	{
		this.city=city;
		this.state=state;
		this.country=country;
	}
	public String toString()
	{
		return city+" "+state+" "+country;
	}
}
```

Employee.java

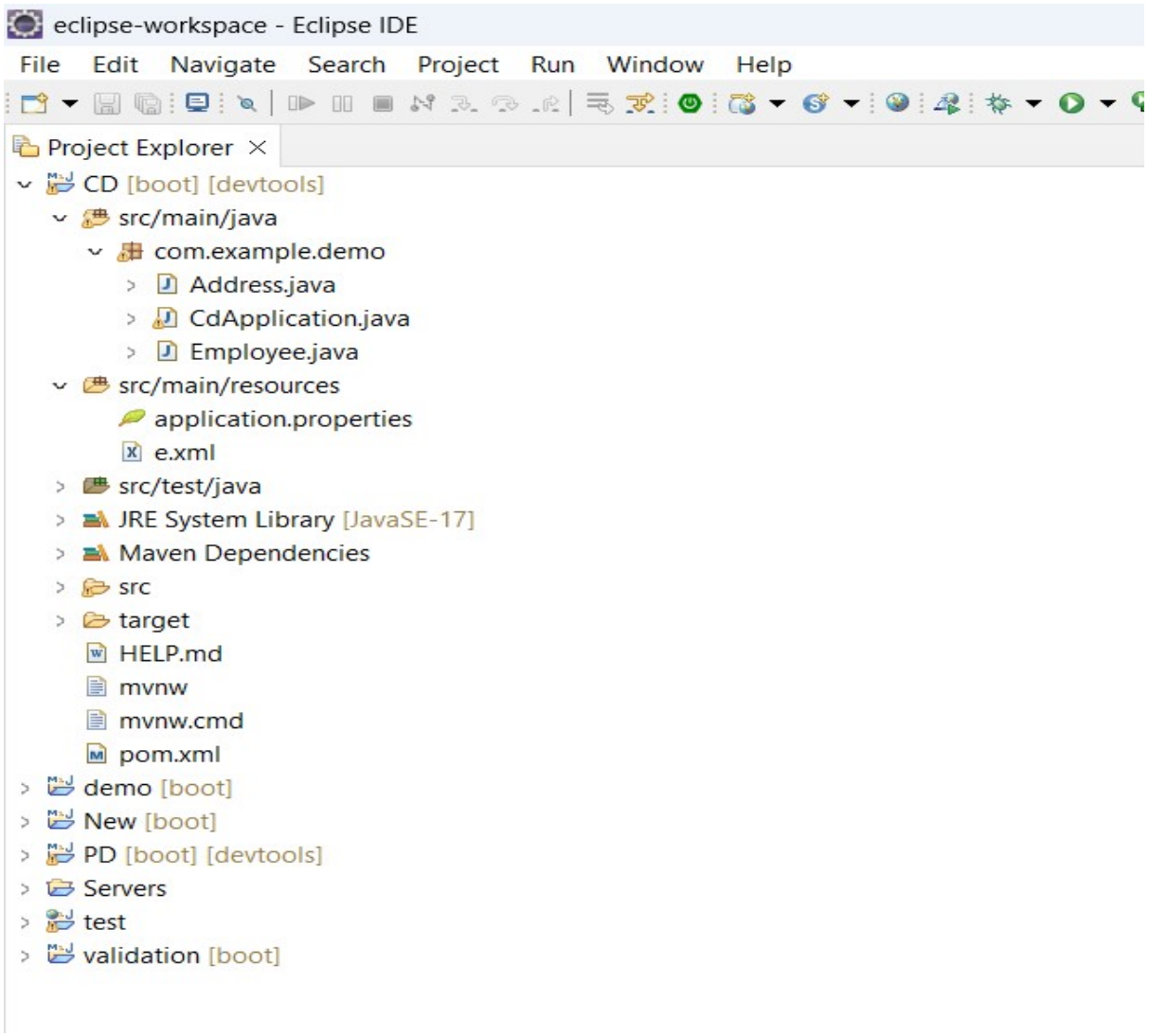
```
package com.example.demo;
public class Employee {
	private int id;
	private String name;
	private Address address;
	public Employee(int id,String name,Address address)
	{
		this.id=id;
		this.name=name;
		this.address=address;
	}
		public String toString()
	{
		return id+" "+name+" "+address;
	}

}
```

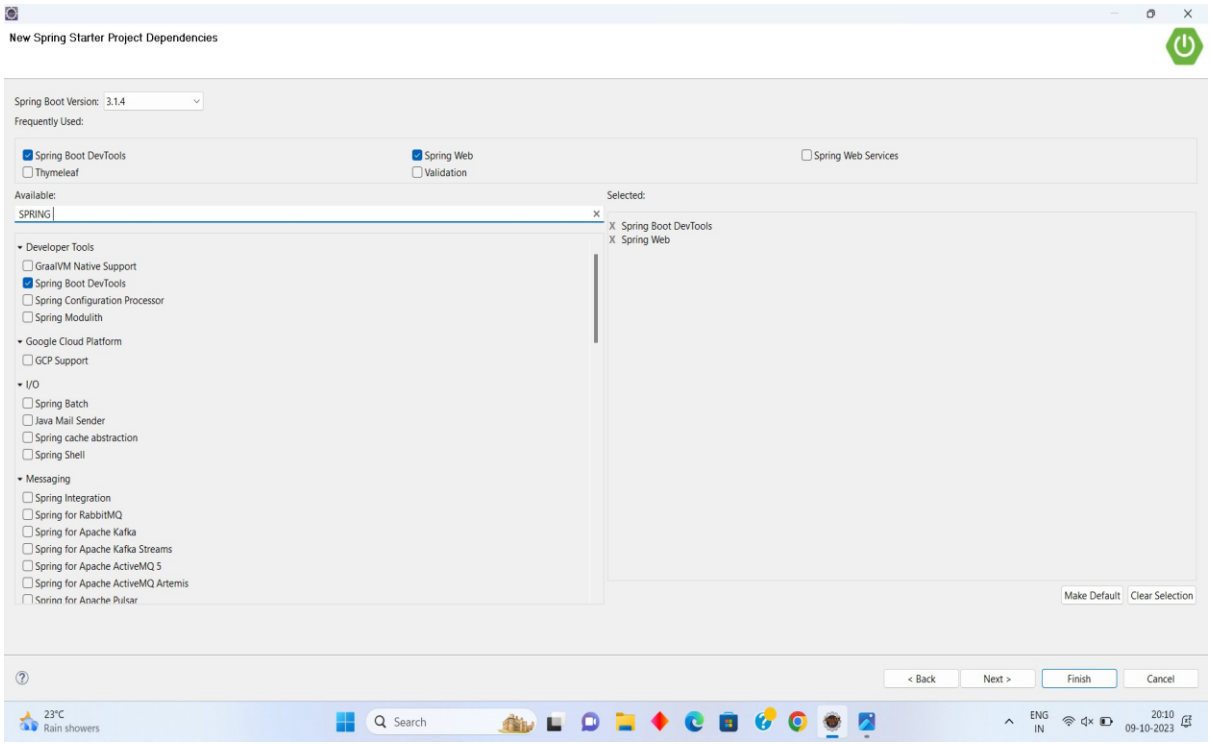
CdApplication.java

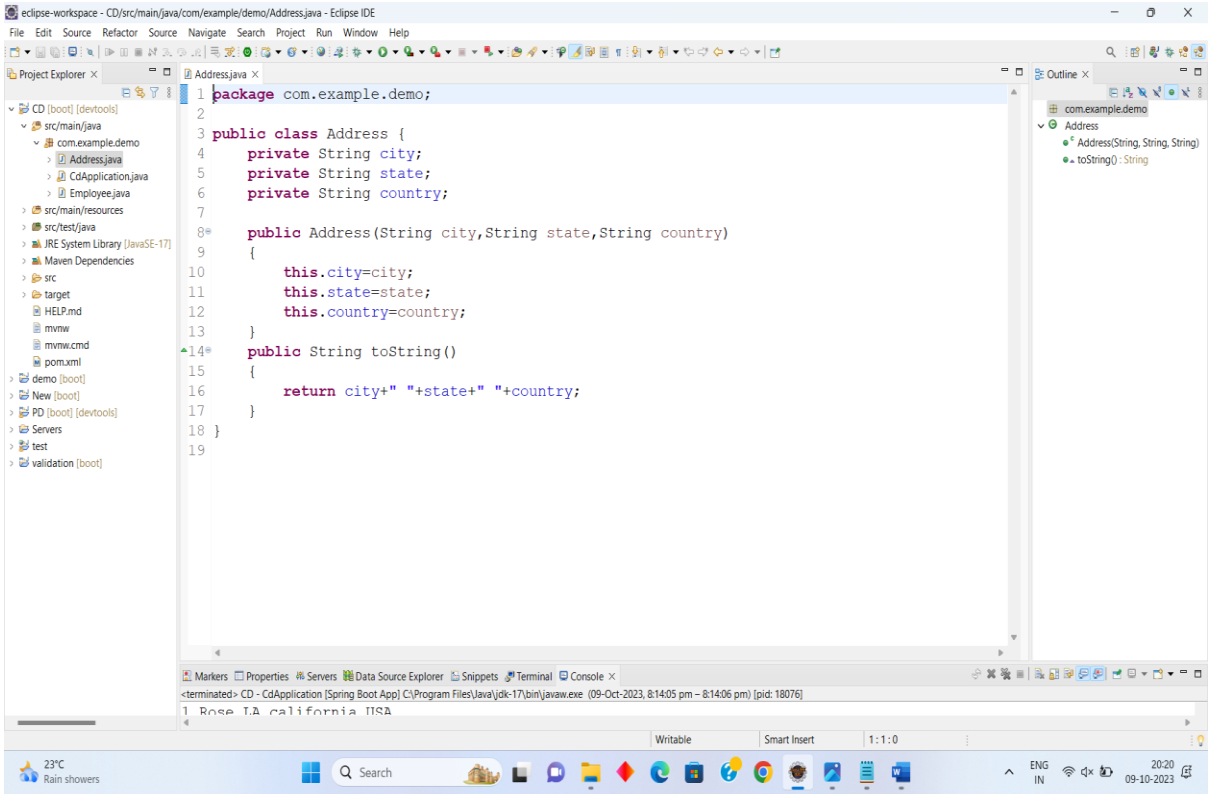
```
package com.example.demo;
import org.springframework.boot.SpringApplication;
import org.springframework.boot.autoconfigure.SpringBootApplication;
import org.springframework.context.support.ClassPathXmlApplicationContext;

@SpringBootApplication
public class CdApplication
{
	public static void main(String[] args)
	{
	//SpringApplication.run(CdApplication.class, args);
	ClassPathXmlApplicationContext context=new ClassPathXmlApplicationContext("e.xml");
	System.out.println(context.getBean("e1"));
	}
}
```

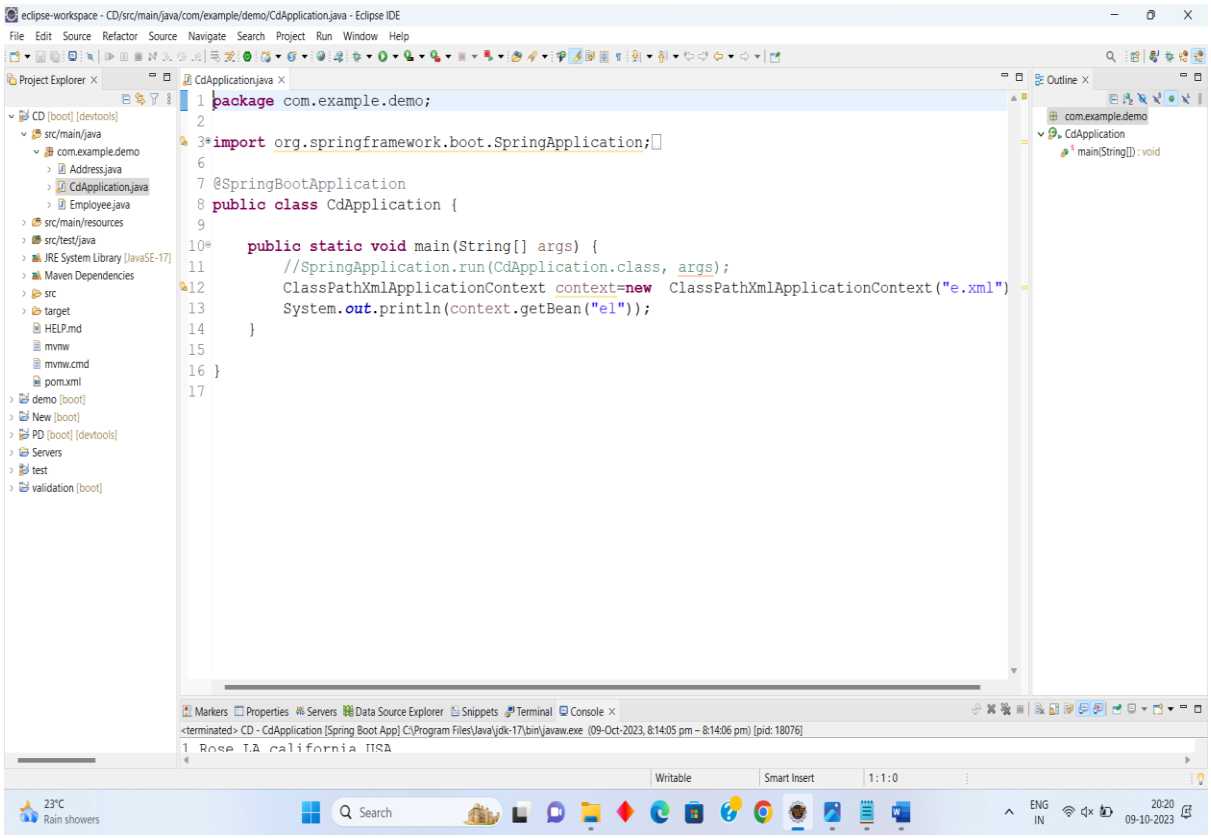
e.xml

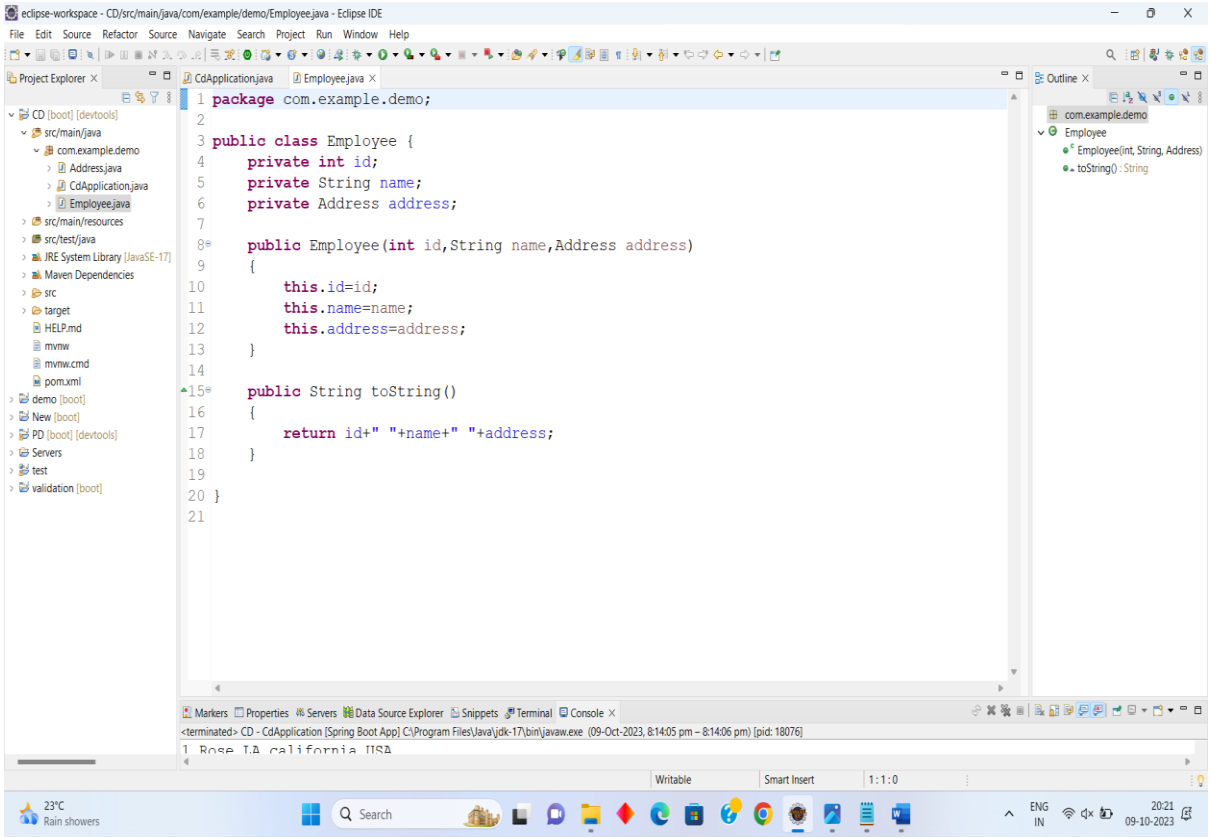
```
<?xml version="1.0" encoding="UTF-8"?>
<beans xmlns="http://www.springframework.org/schema/beans"
   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
   xsi:schemaLocation="http://www.springframework.org/schema/beans
http://www.springframework.org/schema/beans/spring-beans.xsd">

<bean id="a1" class="com.example.demo.Address">
<constructor-arg value="LA"></constructor-arg>
<constructor-arg value="california"></constructor-arg>
<constructor-arg value="USA"></constructor-arg>
</bean>
<bean id="e1" class="com.example.demo.Employee">
<constructor-arg value="1"></constructor-arg>
<constructor-arg value="Rose"></constructor-arg>
<constructor-arg>
<ref bean="a1"></ref>
</constructor-arg>
</bean>
</beans>
```

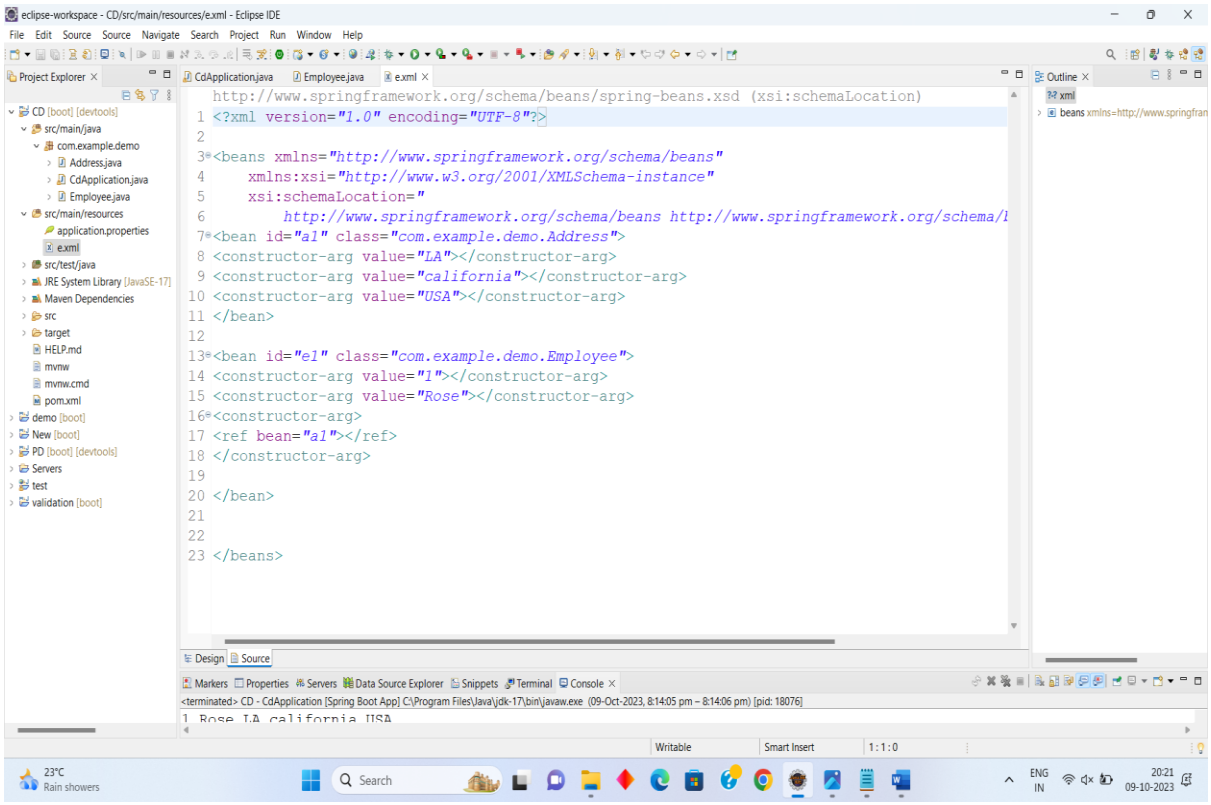

eclipse-workspace - Eclipse IDE
File Edit Navigate Search Project Run Window Help
Project Explorer
CD [boot] [devtools]
src/main/java
com.example.demo
Address.java
CdApplication.java
Employee.java
src/main/resources
application.properties
e.xml
src/test/java
JRE System Library [JavaSE-17]
Maven Dependencies
src
target
HELP.md
mvnw
mvnw.cmd
pom.xml
demo [boot]
New [boot]
PD [boot] [devtools]
Servers
test
validation [boot]


New Spring Starter Project Dependencies
Spring Boot Version: 3.1.4
Frequently Used:
Spring Boot DevTools
Thymeleaf
Spring Web
Validation
Spring Web Services
Available:
SPRING
Developer Tools
GraalVM Native Support
Spring Boot DevTools
Spring Configuration Processor
Spring Modulith
Google Cloud Platform
GCP Support
I/O
Spring Batch
Java Mail Sender
Spring cache abstraction
Spring Shell
Messaging
Spring Integration
Spring for RabbitMQ
Spring for Apache Kafka
Spring for Apache Kafka Streams
Spring for Apache ActiveMQ 5
Spring for Apache ActiveMQ Artemis
Selected:
Spring Boot DevTools
Spring Web
Make Default
Clear Selection
< Back
Next >
Finish
Cancel

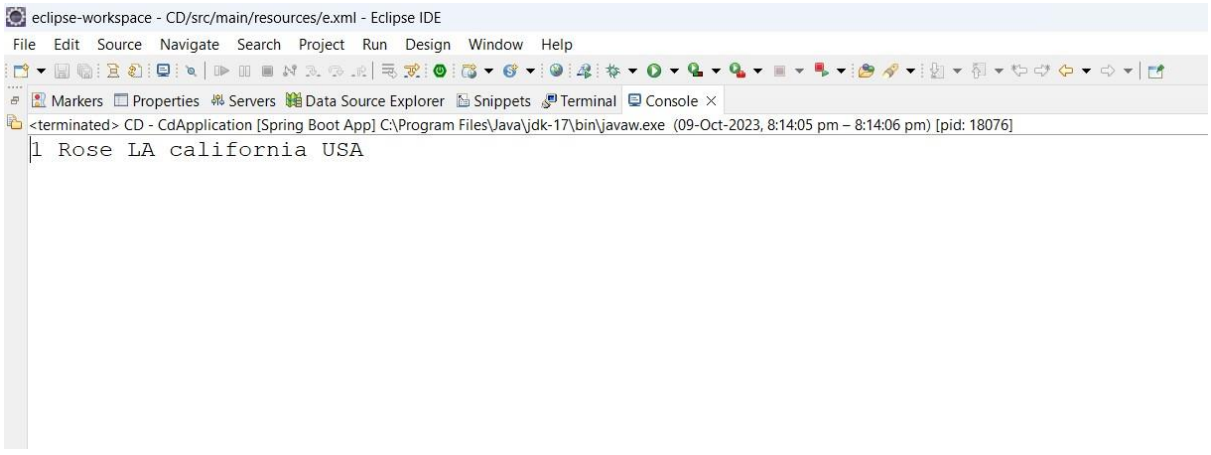

eclipse-workspace - CD/src/main/java/com/example/demo/Address.java - Eclipse IDE
File Edit Source Refactor Source Navigate Search Project Run Window Help
Project Explorer
Address.java
package com.example.demo;
public class Address {
private String city;
private String state;
private String country;
public Address(String city,String state,String country)
{
this.city=city;
this.state=state;
this.country=country;
}
public String toString()
{
return city+" "+state+" "+country;
}
}
Outline
com.example.demo
Address
Address(String, String, String)
toString() : String
Markers Properties Servers Data Source Explorer Snippets Terminal Console
<terminated> CD - CdApplication [Spring Boot App] C:\Program Files\Java\jdk-17\bin\javaw.exe (09-Oct-2023, 8:14:05 pm – 8:14:06 pm) [pid: 18076]
1 Rose I.A california USA
Writable
Smart Insert
1 : 1 : 0


eclipse-workspace - CD/src/main/java/com/example/demo/CdApplication.java - Eclipse IDE
File Edit Source Refactor Source Navigate Search Project Run Window Help
Project Explorer
CdApplication.java
Outline
1 package com.example.demo;
2
3 import org.springframework.boot.SpringApplication;
6
7 @SpringBootApplication
8 public class CdApplication {
9
10 public static void main(String[] args) {
11 //SpringApplication.run(CdApplication.class, args);
12 ClassPathXmlApplicationContext context=new ClassPathXmlApplicationContext("e.xml")
13 System.out.println(context.getBean("el"));
14 }
15
16 }
17
com.example.demo
CdApplication
main(String[]) : void
Markers Properties Servers Data Source Explorer Snippets Terminal Console
<terminated> CD - CdApplication [Spring Boot App] C:\Program Files\Java\jdk-17\bin\javaw.exe (09-Oct-2023, 8:14:05 pm – 8:14:06 pm) [pid: 18076]
1 Rose LA california USA
Writable Smart Insert 1 : 1 : 0
23°C Rain showers
Search
ENG IN
20:20 09-10-2023


eclipse-workspace - CD/src/main/java/com/example/demo/Employee.java - Eclipse IDE
File Edit Source Refactor Source Navigate Search Project Run Window Help
Project Explorer
CdApplication.java
Employee.java
Outline
1 package com.example.demo;
2
3 public class Employee {
4 private int id;
5 private String name;
6 private Address address;
7
8 public Employee(int id,String name,Address address)
9 {
10 this.id=id;
11 this.name=name;
12 this.address=address;
13 }
14
15 public String toString()
16 {
17 return id+" "+name+" "+address;
18 }
19
20 }
21
com.example.demo
Employee
Employee(int, String, Address)
toString() : String
Markers Properties Servers Data Source Explorer Snippets Terminal Console
<terminated> CD - CdApplication [Spring Boot App] C:\Program Files\Java\jdk-17\bin\javaw.exe (09-Oct-2023, 8:14:05 pm – 8:14:06 pm) [pid: 18076]
1 Rose LA california USA
Writable Smart Insert 1 : 1 : 0
23°C Rain showers
Search
ENG IN
20:21 09-10-2023


eclipse-workspace - CD/src/main/resources/e.xml - Eclipse IDE
File Edit Source Source Navigate Search Project Run Window Help
Project Explorer
CdApplication.java
Employee.java
e.xml
Outline
http://www.springframework.org/schema/beans/spring-beans.xsd (xsi:schemaLocation)
<?xml version="1.0" encoding="UTF-8"?>
<beans xmlns="http://www.springframework.org/schema/beans"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
http://www.springframework.org/schema/beans http://www.springframework.org/schema/
<bean id="a1" class="com.example.demo.Address">
<constructor-arg value="LA"></constructor-arg>
<constructor-arg value="california"></constructor-arg>
<constructor-arg value="USA"></constructor-arg>
</bean>
<bean id="e1" class="com.example.demo.Employee">
<constructor-arg value="1"></constructor-arg>
<constructor-arg value="Rose"></constructor-arg>
<constructor-arg>
<ref bean="a1"></ref>
</constructor-arg>
</bean>
</beans>
Design Source
Markers Properties Servers Data Source Explorer Snippets Terminal Console
<terminated> CD - CdApplication [Spring Boot App] C:\Program Files\Java\jdk-17\bin\javaw.exe (09-Oct-2023, 8:14:05 pm – 8:14:06 pm) [pid: 18076]
1 Rose LA california USA
Writable Smart Insert 1 : 1 : 0

Output:-


eclipse-workspace - CD/src/main/resources/e.xml - Eclipse IDE
File Edit Source Navigate Search Project Run Design Window Help
Markers Properties Servers Data Source Explorer Snippets Terminal Console
<terminated> CD - CdApplication [Spring Boot App] C:\Program Files\Java\jdk-17\bin\javaw.exe (09-Oct-2023, 8:14:05 pm – 8:14:06 pm) [pid: 18076]
1 Rose LA california USA