UCA Universidad de Cádiz

Developing Web Applications with Plain Java

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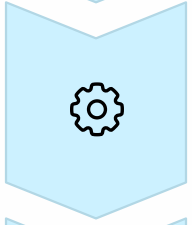
Contents

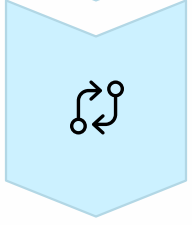
Plain Java Web Development

Introduction to building web apps with Java only



Framework & Setup

Vaadin, Spring Boot configuration and project structure



Development & Integration

UI components, routing, data binding and live coding demo

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What is "Plain Java" Web Development?

Single Language Development

Build entire web applications without writing HTML, CSS or JavaScript

Full-Stack Java

Develop both frontend and backend using only Java

Clean Architecture

Maintain proper separation of concerns with type-safe code

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Why Vaadin?

Component-Based

Build UIs with reusable, high-level Java components that render as Web Components

Enterprise Ready

Production-grade framework with built-in routing, security, and data binding

Spring Boot Integration

Seamlessly integrate with Spring Boot for backend services

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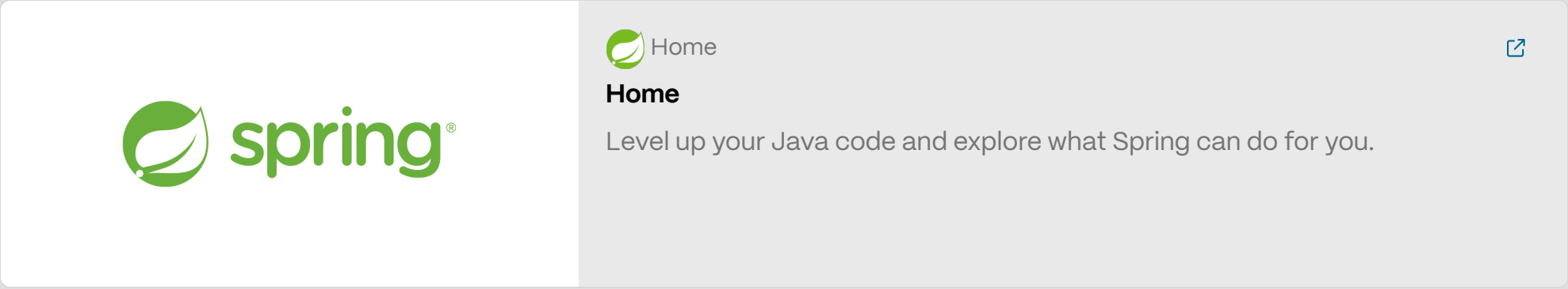
Why Spring Boot?



Streamlined Configuration

Auto-configuration significantly reduces boilerplate code, allowing you to focus on business logic rather than tedious infrastructure setup.

Comprehensive Module Ecosystem

Access a rich collection of modules for Data Access, Security, Web Services, Transactions, Caching, Data Integration, and more, providing robust support for diverse application needs.

Production-Ready Features

Built-in features like metrics, health checks, and externalized configuration simplify the development and deployment of enterprise-grade applications.

Spring Boot seamlessly complements Vaadin by providing a robust backend foundation, while Vaadin handles the UI layer, creating a complete and streamlined Java-only web development experience.

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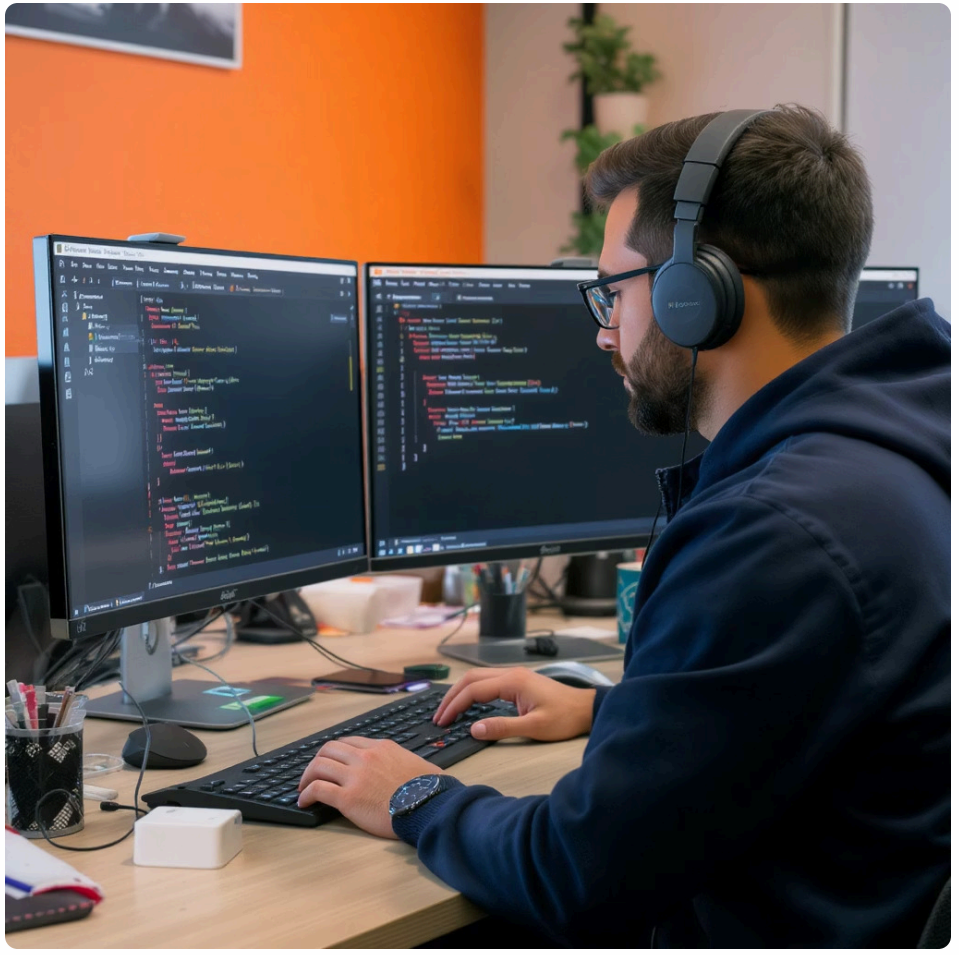
Project Setup



Required Tools

- Java 17 or newer (LTS version)
- **Maven** or Gradle build system
- Spring Initializr or **Vaadin Starter** for project scaffolding
- **IntelliJ IDEA**, VS Code, Eclipse IDE...

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Your First Vaadin View

```
@Route("")
public class MainView extends VerticalLayout {
    public MainView() {
        add(new H1("Welcome to Vaadin!"));
        add(new Button("Click me", e ->
            Notification.show("Clicked!")));
    }
}
```

This minimal view demonstrates:

- @Route annotation mapping to root URL
- Layouts for component organisation
- Event handling with Java lambdas

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Backend Integration

Spring Repositories

```
@Repository
public interface UserRepository extends JpaRepository {
   // save, findById, findAll, delete, etc.
}
```

Leverage Spring Data's powerful repository abstractions for database operations

Service Layer

Separate business logic from views with dedicated service classes

```
@Service
public class UserService {
  @Autowired
  private UserRepository repository;

  public User registerNewUser(String username, String password){
     // TO DO ...
     return repository.save(new User(username,encodePassword(password)));
}
```

Vaadin Views

Inject services into views with standard Spring dependency injection

```
@Route("users")
public class RegisterView extends VerticalLayout {

    @Autowired
    private UserService service;

    public RegisterView() {
        TextField username = new TextField("Username");
        PasswordField password = new PasswordField("Password");
        Button register = new Button("Register", e -> {
            if (!username.isEmpty() && !password.isEmpty()) {
                service.registerNewUser(username.getValue(), password.getValue());
                Notification.show("User registered");
            } else {
                Notification.show("Fields cannot be empty");
            }
        });

        add(username, password, register);
    }
}
```

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Vaadin Starter

start.vaadin.com

Create a new Vaadin app: configure views and customize the theme

A tool that allows you to visually create a custom Spring Boot based Vaadin Flow or Hilla app starter that you can download and open in your IDE.

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Project Structure

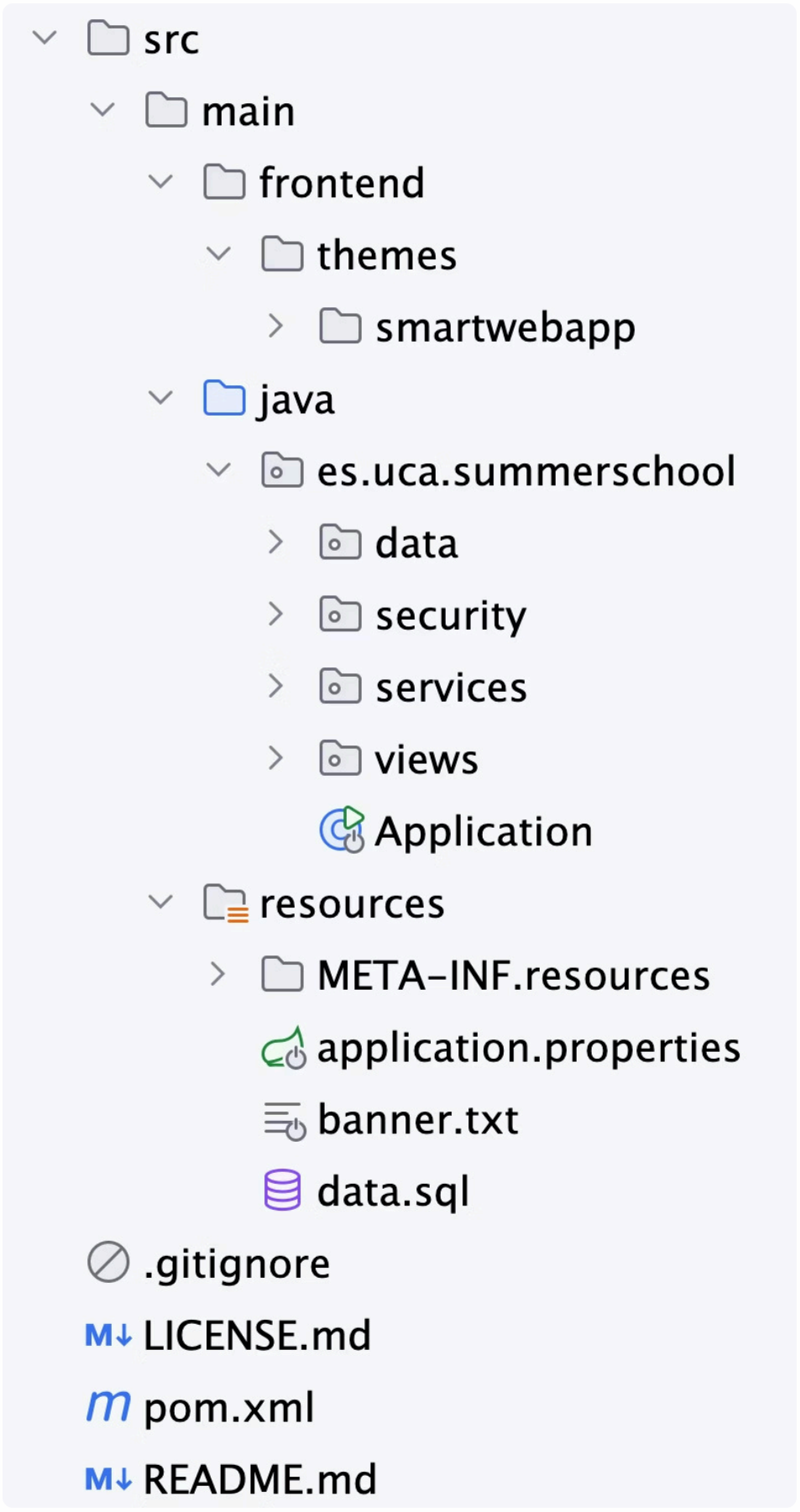
The structure follows Maven conventions with clear separation between application code and resources.

The `frontend` folder contains styles for the visual theme.

The `java` folder contains all Java packages and classes, organized according to their responsibilities (data, security, services, and views).

The `Application` class is the main entry point for the application.

The `resources` folder contains commonly used configuration files.



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Ex 1. Creating a webapp

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Data Binding with Forms

Powerful Object Binding

Vaadin's **Binder<T>** class provides seamless binding between UI fields and Java objects, enabling two-way data flow with built-in validation.

```
Binder binder = new Binder<>(User.class);
binder.bindInstanceFields(this);
```

This automatically connects fields to matching properties in your domain objects.

Validation Options:

- Bean validation annotations (@NotEmpty, @Email)
- Custom validators with lambda expressions
- Cross-field validation rules

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Deploying the Application

Simple Deployment Options

Vaadin applications are packaged as standard Java web applications, making deployment straightforward.

Build the Application

Package your application using Maven or Gradle

```
mvn clean package
```

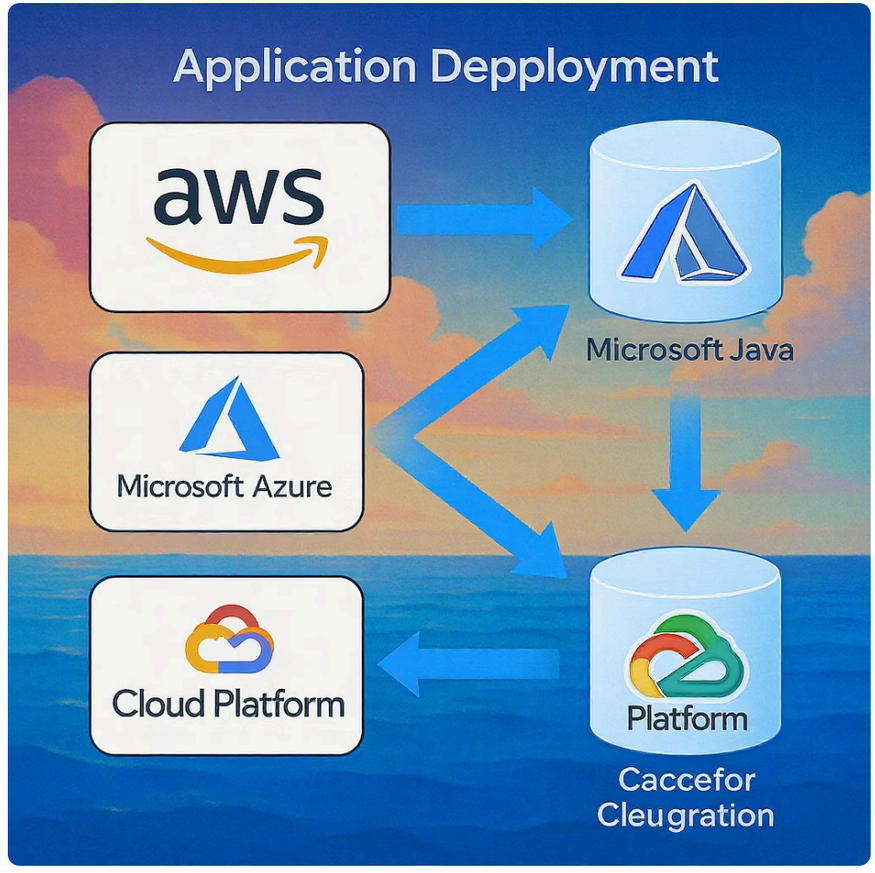
Run the JAR

Execute the self-contained JAR with embedded Tomcat

```
java -jar target/myapp-1.0.jar
```

Cloud Deployment

Deploy to Heroku, AWS, Azure, or Google Cloud



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Pros & Cons of Plain Java UIs

Pros

- Type-safe development with compile-time checks
- Refactoring support across entire codebase
- Reuse backend skills and knowledge
- Single language throughout the stack
- Integrated security model

Cons

- Less direct control over HTML markup
- Heavier runtime than pure JavaScript frameworks
- Learning curve for component model
- More server resources required

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Summary

- Vaadin enables building modern, responsive UIs using pure Java without writing HTML, CSS, or JavaScript
- Spring Boot provides a robust foundation for backend services, security, and data access
- The combined stack offers type-safe, full-stack development with a single language
- Ideal for enterprise applications, internal tools, admin panels, and business applications

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Resources & Q&A

Essential Resources

- Official Documentation: https://vaadin.com/docs
- Starter App Generator: https://start.vaadin.com
- Spring Framework: https://spring.io
- Component Directory: vaadin.com/components
- Community Forum: vaadin.com/forum

Any Questions?

Let's review key concepts or jump back into the code examples for clarification.

Start Your Project | Read Documentation

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