

# Phase 1: Core Spring Boot Foundations – Project 1 SRS

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## Summary/Overview

Purpose: Build proficiency with Spring Boot by creating a simple CRUD application with REST endpoints and database integration. No security, privacy, or compliance requirements in Phase 1.

Outcome: A working app exposing REST APIs and a basic Thymeleaf UI for querying products based on the product name containing the search term, backed by an H2 database.

## Scope

### In scope:

- Spring Boot REST API for Products (CRUD).
- Spring MVC (Thymeleaf) page for editing product descriptions.
- Persistence using Spring Data JPA with H2.
- Basic DTOs and mapping.
- Basic validation for inputs (e.g., name not blank, price non-negative).

### Out of scope (deferred to Phase 2+):

- Authentication/authorization, input sanitization beyond basic validation, audit logging, privacy/compliance controls, deployment hardening.

## Objectives/Goals

- Learn controllers, endpoints, and JSON responses.
- Practice calling APIs with RestTemplate or WebClient.
- Understand templating (Thymeleaf) and MVC basics.
- Learn persistence with Spring Data JPA.
- Essentials for secure input handling(to be expanded in Phase 2).

## Stakeholders

- Developer: Solo developer (author, primary user and maintainer)
- Reviewers: Any collaborators reviewing code on GitHub
- End users: Demo users interacting with the REST API and the Thymeleaf view

## Functional Requirements

### FR-1 Product entity

- Create, read, update, delete Product records.
- Fields (minimum): id (Long, auto-generated), name (String), description (String), price (BigDecimal, scale 2).

### FR-2 Product Repository

- Create a ProductRepository interface to handle CRUD operations on the Product Entity
  - Add abstract method to substring search the product name
    - Returns a list of products

### FR-3 DTOs and Validation

- Request DTO for searching for text in product name:
  - name: not blank, max length (e.g., 100), sanitization regex pattern

- Response DTO for returning required fields.

#### **FR-4 ProductService Logic**

- Contains the business logic to return results from the client requests
- Handles DTO mapping for requests and responses

#### **FR-5 REST API**

- Create Product: POST /api/products
- Get Product by id: GET /api/products/{id}
- List Products: GET /api/products
- Update Product: PUT /api/products/{id}
- Delete Product: DELETE /api/products/{id}
- Return JSON responses with appropriate HTTP status codes.

#### **FR-6 Web (Thymeleaf) UI**

- GET / -> form.html
- Show basic validation errors on the form.
- Search contents: : POST / returns results if valid

#### **FR-7 Data Initialization**

- Seed sample Products on startup via CommandLineRunner for demo purposes.

### **Technical Requirements**

#### **TR-1 Platform and Frameworks**

- Apache Maven 3.9.12
- Java 21+ (or current LTS)
- Spring Boot 4.0.1

- Spring Web, Spring Data JPA, Thymeleaf, Validation (jakarta.validation)
- H2 in-memory or file-based database for development/demo

## TR-2 Database

- Product table with columns:
  - id BIGINT (PK, auto-increment)
  - name VARCHAR(100) UNIQUE NOT NULL
  - description VARCHAR(1000) NULL
  - price DECIMAL(12,2) NOT NULL
- Use Hibernate DDL auto for schema generation (create-drop or update) for demo.

## TR-3 Persistence Layer

- ProductRepository extends JpaRepository<Product, Long>.
- Entity annotated with @Entity/@Table. BigDecimal for price with @Column(precision=12, scale=2).

## TR-4 Controllers

- ProductRestController under /api/products produces/consumes application/json.
- ProductWebController under / returns view names; uses Model for data.

## TR-5 Error Handling

- REST: Return 400 with validation messages on invalid input; 404 when entity not found.
- Web: Re-render form with BindingResult errors.

## TR-6 Testing

- Unit tests for service.

- Slice tests for controllers (@WebMvcTest) and repository (@DataJpaTest).
- Basic integration test using @SpringBootTest with H2.

## Non-Functional Requirements (Phase 1)

### NFR-1 Usability

- Simple HTML forms and lists with Thymeleaf; no styling requirements.

### NFR-2 Performance

- Suitable for small datasets; H2 suffices.

### NFR-3 Reliability

- Basic happy-path tests; restart-safe if using file-based H2.

### NFR-4 Maintainability

- Clear layering (Controller -> Service -> Repository), DTOs separate from entities.

## Assumptions and Constraints

- Single developer; local development environment only.
- No external systems or third-party APIs required.
- No authentication in Phase 1; /admin paths are open during demo.
- Build tool: Maven

## Acceptance Criteria

### AC-1 Create Product

- Creating a product via POST /api/products returns 201 and a JSON body with id, name, description, price.

### AC-2 Get Product by id

- Retrieving a product by id returns 200 with correct data; non-existent id returns 404.

### **AC-3 Update Product**

- Updating a product via PUT persists changes, including price scale normalization to two decimals.

### **AC-4 Delete Product**

- Deleting a product returns 204 and the record no longer appears in listings.

### **AC-5 Web (Thymeleaf) UI**

- Thymeleaf list page displays seeded products; edit page updates description and redirects back to list showing the change.

### **AC-6 Validation errors**

- Blank name → reported as error in both REST (400 with field messages) and UI (form error).
- Negative price → rejected with appropriate message.

## Milestones

### **M-1 Project skeleton**

- dependencies, basic app runs with H2.

### **M-2 Domain + repository**

- Product entity, JpaRepository, schema generation.

### **M-3 DTOs**

- DTOs + service layer implemented.

### **M-4 REST**

- controller endpoints complete with validation and error handling.

#### **M-5 Thymeleaf**

- pages and MVC controller for list/edit description.

#### **M-6 Data**

- seeding via CommandLineRunner and smoke tests.

#### **M-7 Tests**

- (unit + basic integration) and documentation.

## Definitions

**REST endpoint** - a specific URL that acts as the entry point for an application or service to communicate with a server to access or manipulate resources via HTTP.

**Entity** - A persistence model class mapped to a database table with JPA annotations.

**DTO (Data Transfer Object)** - A class used to carry data across layers or over the wire (API), without persistence annotations.

**Repository** - A Spring Data interface providing CRUD access to entities.

**CRUD** - Create, Read, Update, Delete operations on resources.

**JPA** - Java Persistence API, specification for ORM mapping between Java objects and relational databases.

**H2** - An in-memory/file-based relational database suited for development/testing.

**Thymeleaf** - A server-side Java template engine for rendering HTML views in Spring MVC.

**CommandLineRunner** - A Spring callback interface used to run code at application startup.

## Resources

Spring. (n.d.-a). ResponseEntity.

[ResponseEntity :: Spring Framework](#)

Spring. (n.d.-b). Building A RESTful Web Service.

[Getting Started | Building a RESTful Web Service](#)

Spring. (n.d.-c). Consuming A RESTful Web Service.

[Getting Started | Consuming a RESTful Web Service](#)

Spring. (n.d.-d). Serving Web Content with Spring MVC.

[Getting Started | Serving Web Content with Spring MVC](#)

Spring. (n.d.-e). Accessing Data with JPA.

[Getting Started | Accessing Data with JPA](#)

Spring. (n.d.-f). Validating Form Input.

[Getting Started | Validating Form Input](#)