UNIVERSIDAD MARIANO GÁLVEZ DE GUATEMALA

FACULTAD DE INGENIERIA EN SISTEMAS DE INFORMACIÓN Y CIENCIAS DE LA COMPUTACIÓN

DESARROLLO WEB – 22025–4590–036–5

ING. WALTER ANIBAL CORDOVA ZECEÑA

EXAMEN FINAL

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6190–19–1774

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INTRODUCCIÓN

1. CONTEXTO

Plataforma de Control de Pedidos Multiplataforma

Tecnologías: Next.js + Spring Boot + Maven + MariaDB + PostgreSQL

La empresa MultiPedidos S.A. administra pedidos de distintos clientes y proveedores en varias regiones.

Por políticas internas y requerimientos técnicos:

- El módulo de Clientes y Pedidos debe operar en una base MariaDB (infraestructura regional).
- El módulo de Proveedores y Facturación debe operar en una base PostgreSQL (infraestructura corporativa).
- Ambos módulos deben compartir una lógica de negocio común (cálculos, validaciones y descuentos) implementada en una librería Maven compartida.

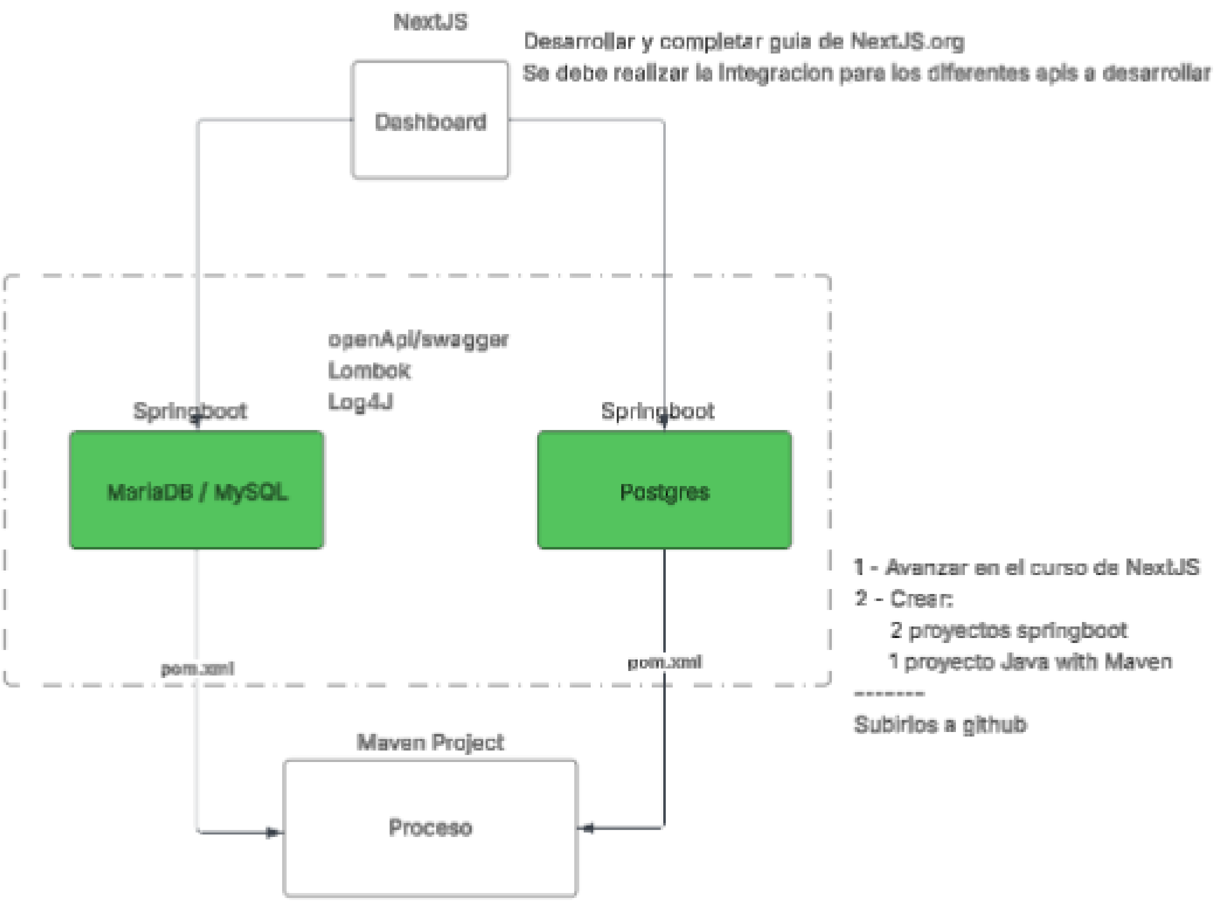
El Dashboard en Next.js será el panel administrativo que muestre información combinada proveniente de ambos servicios.

2. Objetivo General

Diseñar e implementar una solución completa con arquitectura distribuida, integrando:

- Un frontend web en Next.js (tutorial oficial de Next.org).
- Dos microservicios Spring Boot independientes con persistencia en bases de datos distintas.
- Un proyecto Maven reutilizable que funcione como dependencia común para ambos microservicios.

El propósito es que los estudiantes piensen como arquitectos de software, definan la comunicación entre componentes, la lógica compartida y la integración de datos en una arquitectura modular.



Desarrollar y completar guia de NextJS.org
Se debe realizar la integracion para los diferentes apis a desarrollar

1 - Avanzar en el curso de NextJS
2 - Crear:
2 proyectos springboot
1 proyecto Java with Maven

Subirlos a github

3. Tecnologías implementadas

- Backend: Spring Boot 3.5.7 con Java 17
- Bases de datos: MariaDB y PostgreSQL
- Frontend: Next.js 16 con React 19 y TypeScript
- Gestión de dependencias: Maven
- Documentación API: OpenAPI/Swagger

4. Arquitectura

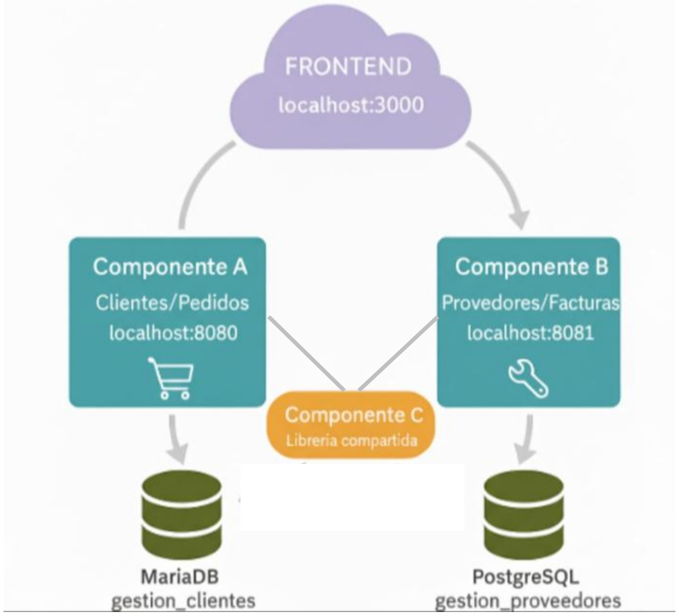
4.1. Diagrama de Arquitectura

Dashboard (Next.js) → consume APIs REST → Componente A + B

Componente A (8080) → MariaDB

Componente B (8081) → PostgreSQL

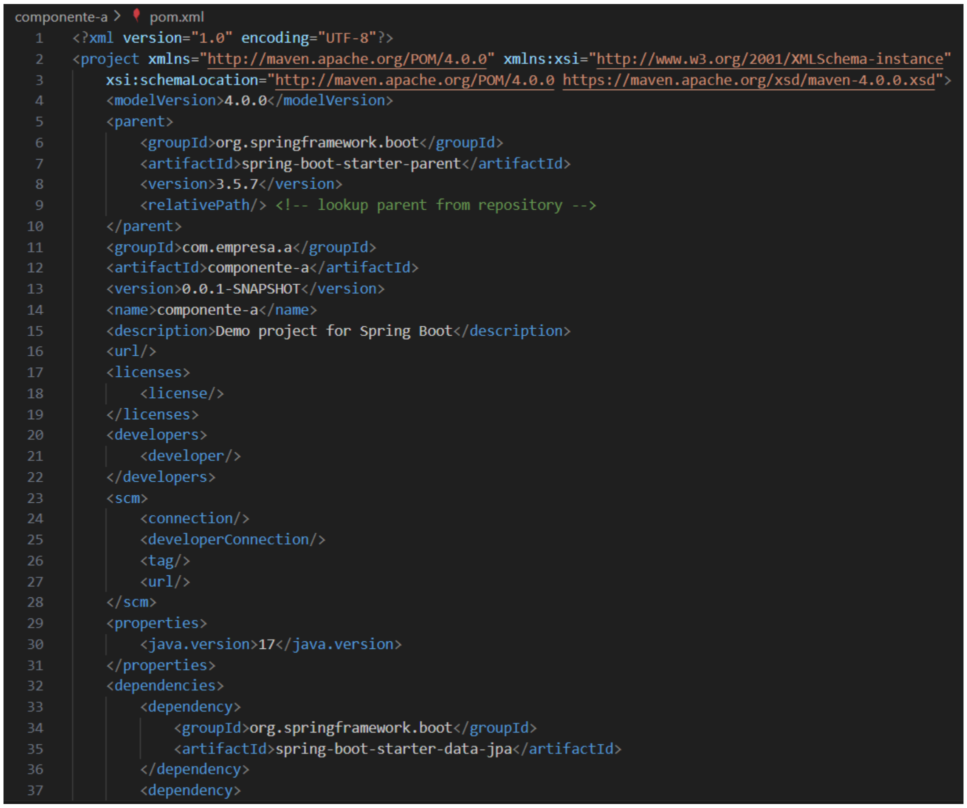
Ambos usan → Componente C (librería compartida)



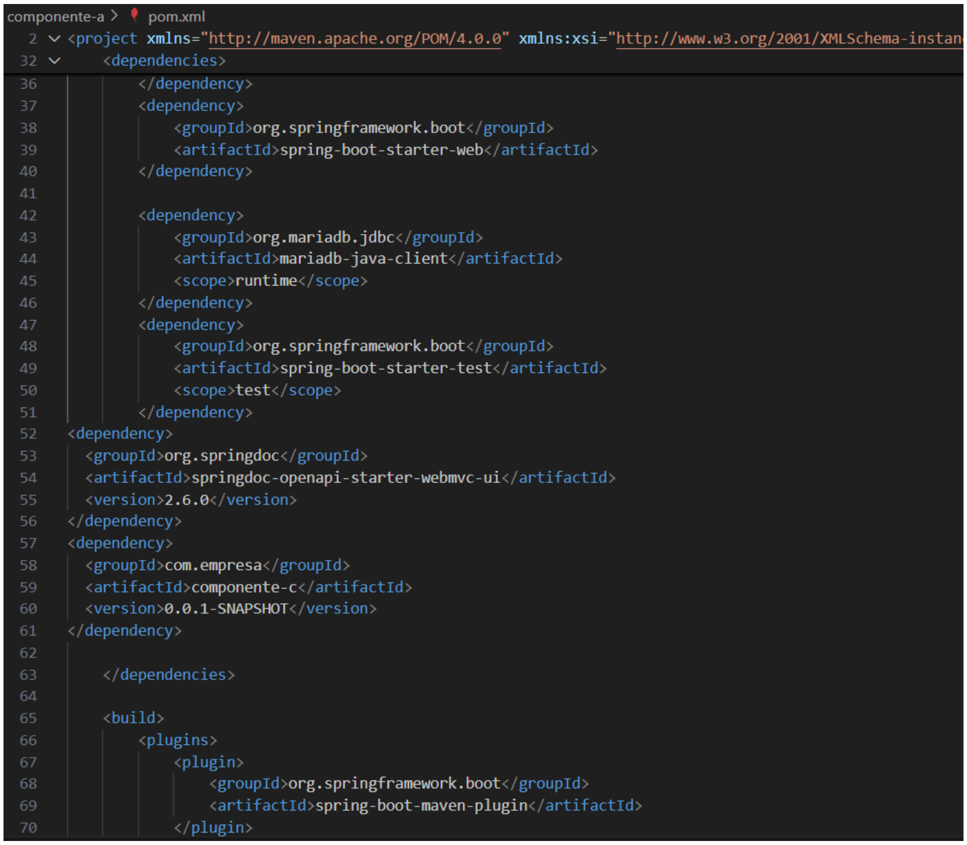
5. COMPONENTE A – CLIENTES Y PEDIDOS

5.1. Configuración

Dependencias: Spring Boot 3.5.7, JPA, Web, MariaDB, OpenAPI, componente-c



```xml
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 https://maven.apache.org/xsd/maven-4.0.0.xsd">
    <modelVersion>4.0.0</modelVersion>
    <parent>
        <groupId>org.springframework.boot</groupId>
        <artifactId>spring-boot-starter-parent</artifactId>
        <version>3.5.7</version>
        <relativePath/> <!-- lookup parent from repository -->
    </parent>
    <groupId>com.empresa.a</groupId>
    <artifactId>componente-a</artifactId>
    <version>0.0.1-SNAPSHOT</version>
    <name>componente-a</name>
    <description>Demo project for Spring Boot</description>
    <url/>
    <licenses>
        <license/>
    </licenses>
    <developers>
        <developer/>
    </developers>
    <scm>
        <connection/>
        <developerConnection/>
        <tag/>
        <url/>
    </scm>
    <properties>
        <java.version>17</java.version>
    </properties>
    <dependencies>
        <dependency>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-starter-data-jpa</artifactId>
        </dependency>
        <dependency>
```



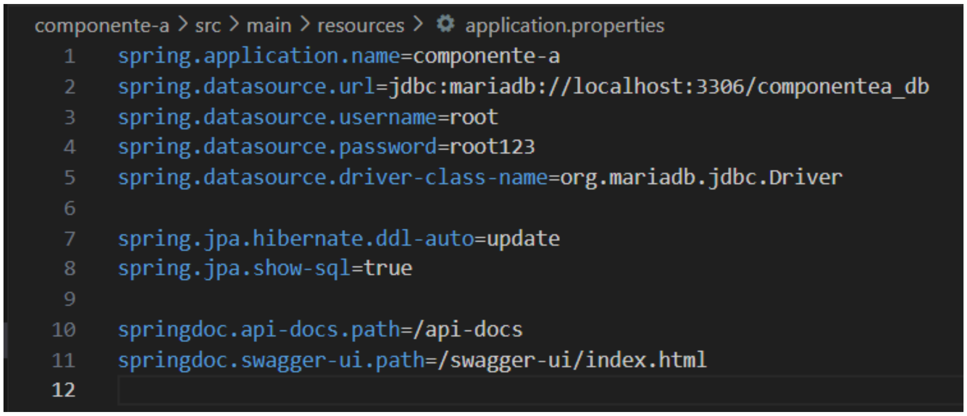
```xml
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instan
    <dependencies>
        </dependency>
        <dependency>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-starter-web</artifactId>
        </dependency>

        <dependency>
            <groupId>org.mariadb.jdbc</groupId>
            <artifactId>mariadb-java-client</artifactId>
            <scope>runtime</scope>
        </dependency>
        <dependency>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-starter-test</artifactId>
            <scope>test</scope>
        </dependency>
<dependency>
  <groupId>org.springdoc</groupId>
  <artifactId>springdoc-openapi-starter-webmvc-ui</artifactId>
  <version>2.6.0</version>
</dependency>
<dependency>
  <groupId>com.empresa</groupId>
  <artifactId>componente-c</artifactId>
  <version>0.0.1-SNAPSHOT</version>
</dependency>

    </dependencies>

    <build>
        <plugins>
            <plugin>
                <groupId>org.springframework.boot</groupId>
                <artifactId>spring-boot-maven-plugin</artifactId>
            </plugin>
```

5.2. Base de Datos

Conexión: jdbc:mariadb://localhost:3306/componentea_db

Usuario: root

DDL Auto: update (crea tablas automáticamente)

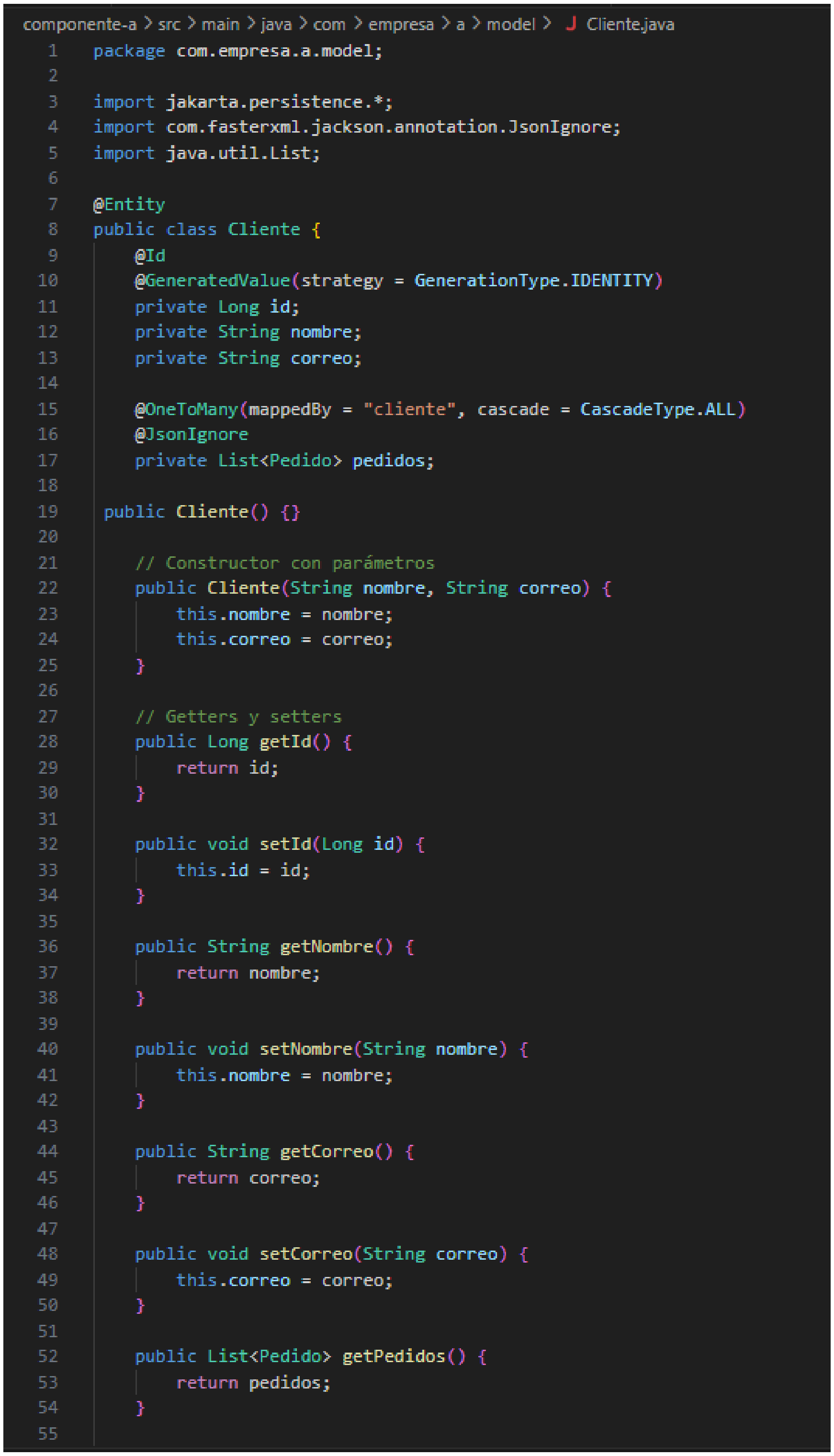

componente-a > src > main > resources > application.properties

```properties
spring.application.name=componente-a
spring.datasource.url=jdbc:mariadb://localhost:3306/componentea_db
spring.datasource.username=root
spring.datasource.password=root123
spring.datasource.driver-class-name=org.mariadb.jdbc.Driver

spring.jpa.hibernate.ddl-auto=update
spring.jpa.show-sql=true

springdoc.api-docs.path=/api-docs
springdoc.swagger-ui.path=/swagger-ui/index.html

```

Swagger: http://localhost:8080/swagger-ui/index.html

5.3. Modelos

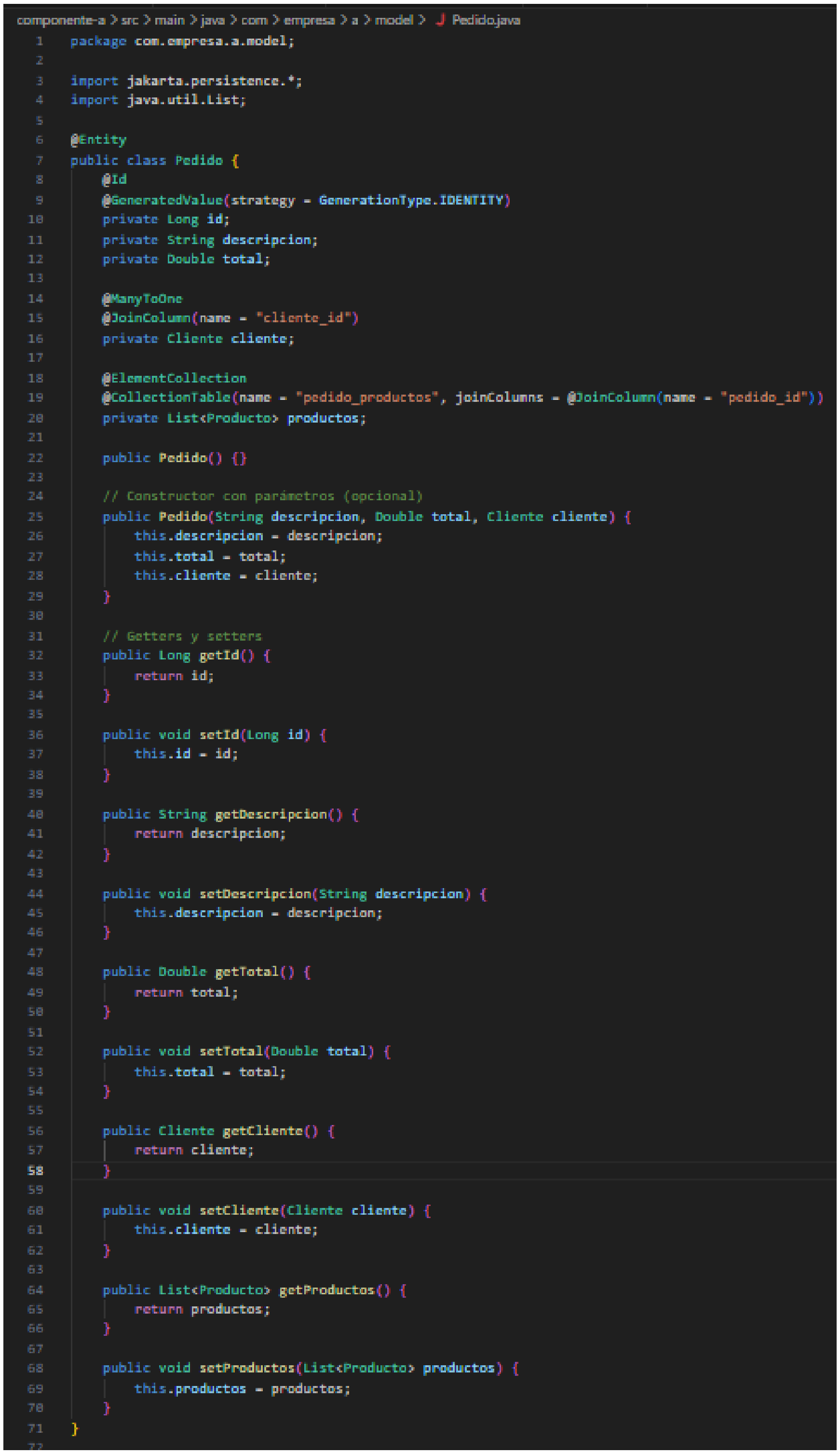
Cliente: @Entity con id, nombre, email, teléfono



componente-a > src > main > java > com > empresa > a > model > Cliente.java

```java
package com.empresa.a.model;

import jakarta.persistence.*;
import com.fasterxml.jackson.annotation.JsonIgnore;
import java.util.List;

@Entity
public class Cliente {
    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    private Long id;
    private String nombre;
    private String correo;

    @OneToMany(mappedBy = "cliente", cascade = CascadeType.ALL)
    @JsonIgnore
    private List<Pedido> pedidos;

 public Cliente() {}

    // Constructor con parámetros
    public Cliente(String nombre, String correo) {
        this.nombre = nombre;
        this.correo = correo;
    }

    // Getters y setters
    public Long getId() {
        return id;
    }

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

    public String getNombre() {
        return nombre;
    }

    public void setNombre(String nombre) {
        this.nombre = nombre;
    }

    public String getCorreo() {
        return correo;
    }

    public void setCorreo(String correo) {
        this.correo = correo;
    }

    public List<Pedido> getPedidos() {
        return pedidos;
    }

```

Pedido: @Entity con id, fecha, total, estado, clienteId



componente-a > src > main > java > com > empresa > a > model > Pedido.java

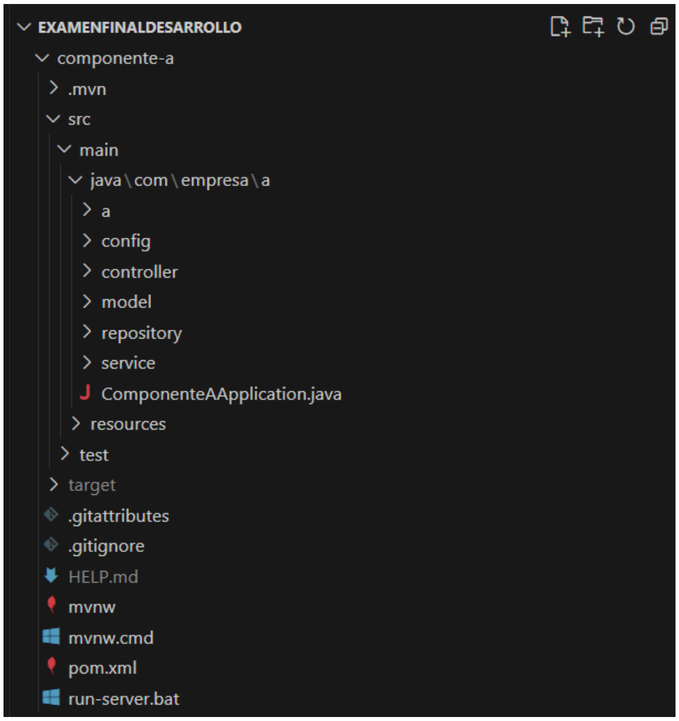
```java
package com.empresa.a.model;

import jakarta.persistence.*;
import java.util.List;

@Entity
public class Pedido {
    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    private Long id;
    private String descripcion;
    private Double total;

    @ManyToOne
    @JoinColumn(name = "cliente_id")
    private Cliente cliente;

    @ElementCollection
    @CollectionTable(name = "pedido_productos", joinColumns = @JoinColumn(name = "pedido_id"))
    private List<Producto> productos;

    public Pedido() {}

    // Constructor con parámetros (opcional)
    public Pedido(String descripcion, Double total, Cliente cliente) {
        this.descripcion = descripcion;
        this.total = total;
        this.cliente = cliente;
    }

    // Getters y setters
    public Long getId() {
        return id;
    }

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

    public String getDescripcion() {
        return descripcion;
    }

    public void setDescripcion(String descripcion) {
        this.descripcion = descripcion;
    }

    public Double getTotal() {
        return total;
    }

    public void setTotal(Double total) {
        this.total = total;
    }

    public Cliente getCliente() {
        return cliente;
    }

    public void setCliente(Cliente cliente) {
        this.cliente = cliente;
    }

    public List<Producto> getProductos() {
        return productos;
    }

    public void setProductos(List<Producto> productos) {
        this.productos = productos;
    }
}
```

Anotaciones JPA: @Id, @GeneratedValue(IDENTITY)

5.4. Arquitectura del Código

Patrón MVC:

- Controller: Endpoints REST (@RestController, @RequestMapping)
- Service: Lógica de negocio (@Service, @Autowired)
- Repository: Persistencia (JpaRepository)
- Model: Entidades JPA

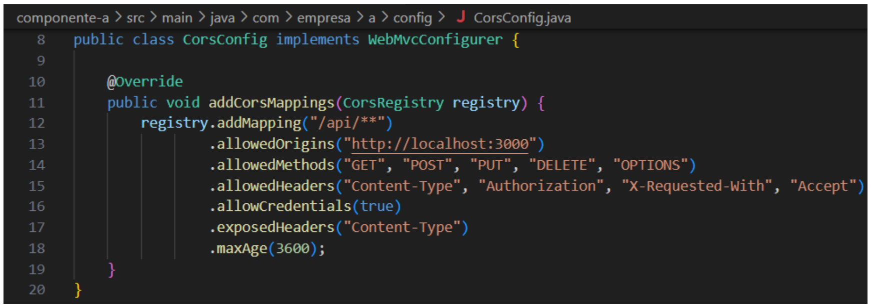


```
EXAMENFINALDESARROLLO
  componente-a
    .mvn
    src
      main
        java\com\empresa\a
          a
          config
          controller
          model
          repository
          service
          ComponenteAApplication.java
        resources
      test
    target
    .gitattributes
    .gitignore
    HELP.md
    mvnw
    mvnw.cmd
    pom.xml
    run-server.bat
```

Endpoints: GET/POST/PUT/DELETE para /api/clientes y /api/pedidos

5.5. CORS

Permite peticiones desde localhost:3000 (frontend) hacia localhost:8080



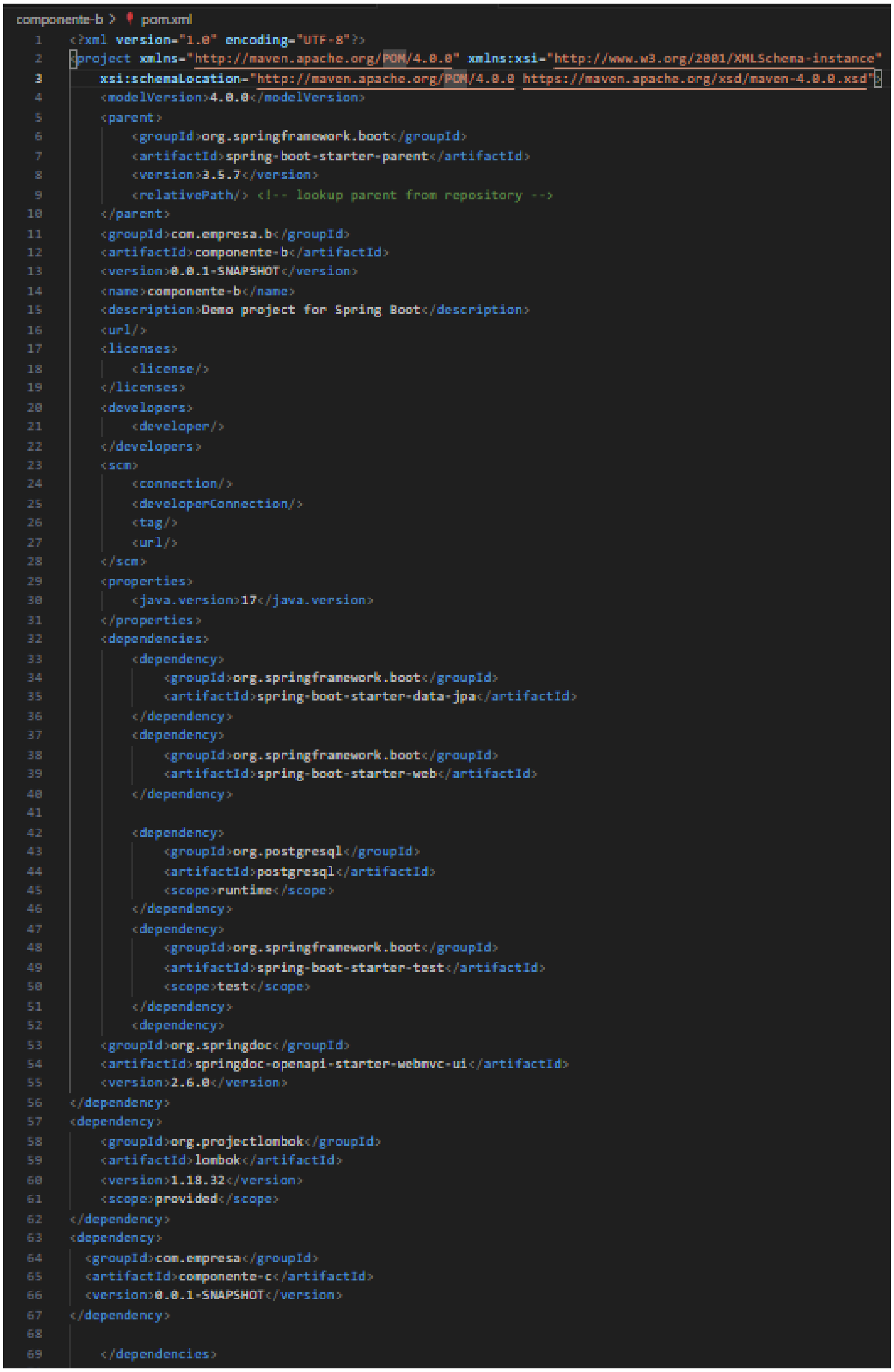
componente-a > src > main > java > com > empresa > a > config > CorsConfig.java

```java
public class CorsConfig implements WebMvcConfigurer {

    @Override
    public void addCorsMappings(CorsRegistry registry) {
        registry.addMapping("/api/**")
                .allowedOrigins("http://localhost:3000")
                .allowedMethods("GET", "POST", "PUT", "DELETE", "OPTIONS")
                .allowedHeaders("Content-Type", "Authorization", "X-Requested-With", "Accept")
                .allowCredentials(true)
                .exposedHeaders("Content-Type")
                .maxAge(3600);
    }
}
```

6. COMPONENTE B – PROVEEDORES Y FACTURAS7

6.1. Configuración

Similar a Componente A pero con PostgreSQL y Lombok. Puerto 8081.



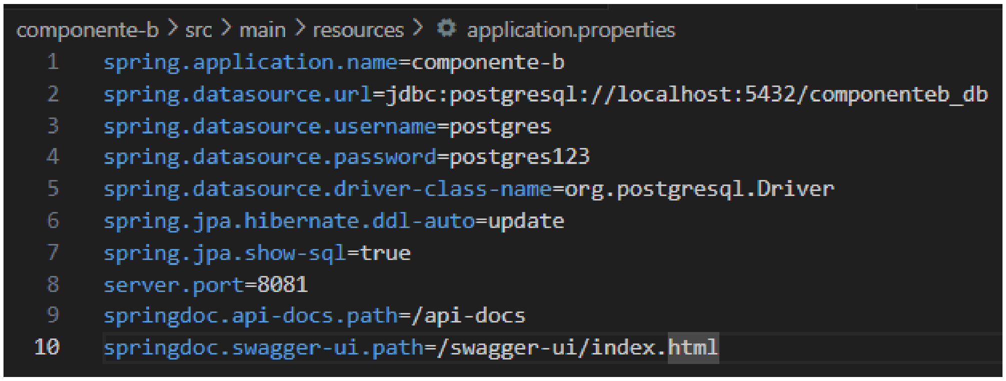
```xml
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 https://maven.apache.org/xsd/maven-4.0.0.xsd">
    <modelVersion>4.0.0</modelVersion>
    <parent>
        <groupId>org.springframework.boot</groupId>
        <artifactId>spring-boot-starter-parent</artifactId>
        <version>3.5.7</version>
        <relativePath/> <!-- lookup parent from repository -->
    </parent>
    <groupId>com.empresa.b</groupId>
    <artifactId>componente-b</artifactId>
    <version>0.0.1-SNAPSHOT</version>
    <name>componente-b</name>
    <description>Demo project for Spring Boot</description>
    <url/>
    <licenses>
        <license/>
    </licenses>
    <developers>
        <developer/>
    </developers>
    <scm>
        <connection/>
        <developerConnection/>
        <tag/>
        <url/>
    </scm>
    <properties>
        <java.version>17</java.version>
    </properties>
    <dependencies>
        <dependency>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-starter-data-jpa</artifactId>
        </dependency>
        <dependency>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-starter-web</artifactId>
        </dependency>

        <dependency>
            <groupId>org.postgresql</groupId>
            <artifactId>postgresql</artifactId>
            <scope>runtime</scope>
        </dependency>
        <dependency>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-starter-test</artifactId>
            <scope>test</scope>
        </dependency>
        <dependency>
    <groupId>org.springdoc</groupId>
    <artifactId>springdoc-openapi-starter-webmvc-ui</artifactId>
    <version>2.6.0</version>
</dependency>
<dependency>
    <groupId>org.projectlombok</groupId>
    <artifactId>lombok</artifactId>
    <version>1.18.32</version>
    <scope>provided</scope>
</dependency>
<dependency>
  <groupId>com.empresa</groupId>
  <artifactId>componente-c</artifactId>
  <version>0.0.1-SNAPSHOT</version>
</dependency>

    </dependencies>
```

6.2. Base de Datos

Conexión: jdbc:postgresql://localhost:5432/componenteb_db

Usuario: postgres

Puerto: 8081

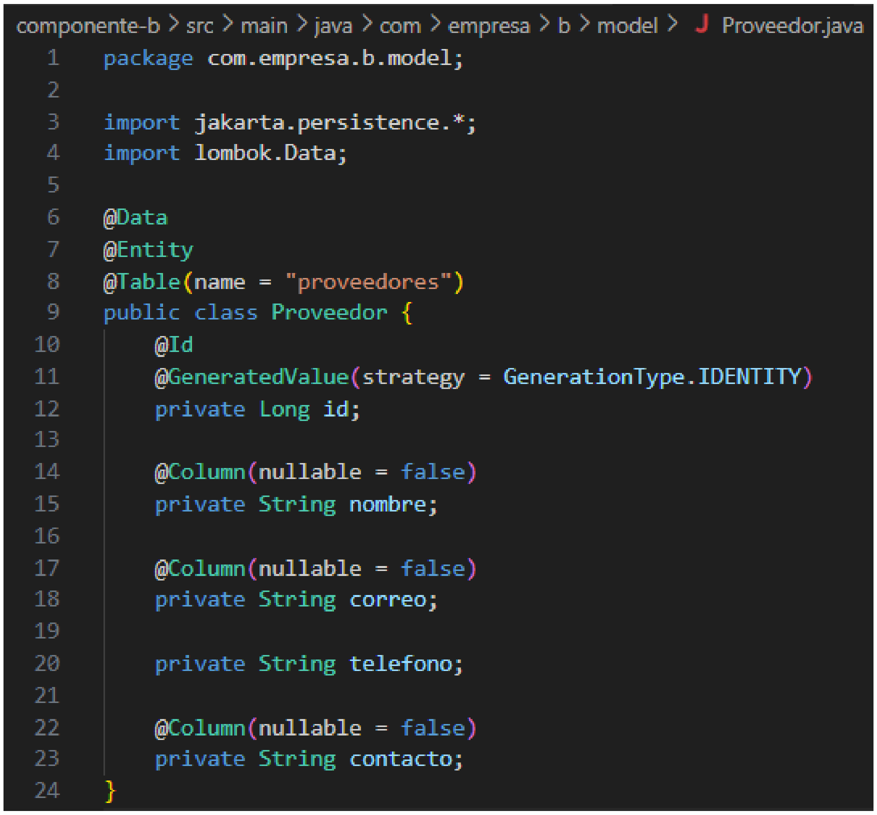

componente-b > src > main > resources > application.properties

```
spring.application.name=componente-b
spring.datasource.url=jdbc:postgresql://localhost:5432/componenteb_db
spring.datasource.username=postgres
spring.datasource.password=postgres123
spring.datasource.driver-class-name=org.postgresql.Driver
spring.jpa.hibernate.ddl-auto=update
spring.jpa.show-sql=true
server.port=8081
springdoc.api-docs.path=/api-docs
springdoc.swagger-ui.path=/swagger-ui/index.html
```

6.3. Modelos con Lombok

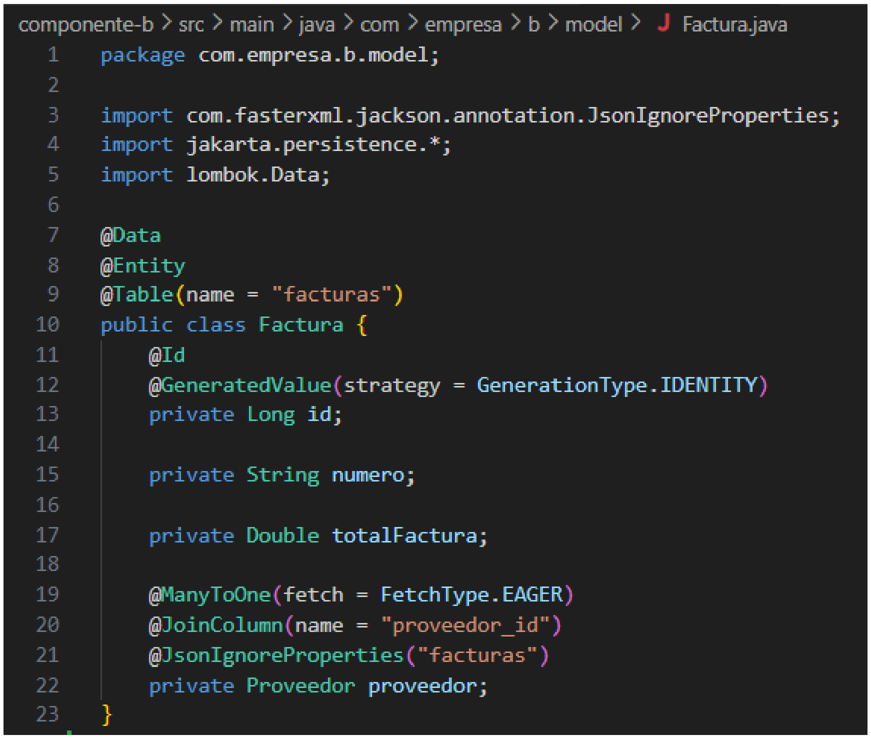
@Data de Lombok genera getters/setters/toString automáticamente

Proveedor: id, nombre, contacto, teléfono, email


componente-b > src > main > java > com > empresa > b > model > Proveedor.java

```java
package com.empresa.b.model;

import jakarta.persistence.*;
import lombok.Data;

@Data
@Entity
@Table(name = "proveedores")
public class Proveedor {
    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    private Long id;

    @Column(nullable = false)
    private String nombre;

    @Column(nullable = false)
    private String correo;

    private String telefono;

    @Column(nullable = false)
    private String contacto;
}
```

Factura: id, numero, fecha, monto, estado, proveedorId

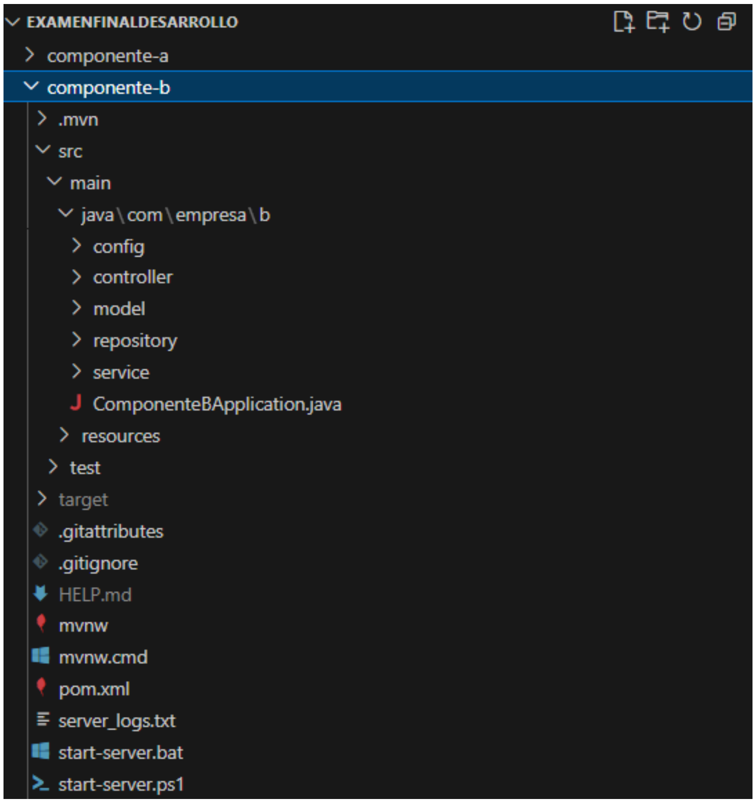


componente-b > src > main > java > com > empresa > b > model > Factura.java

```java
package com.empresa.b.model;

import com.fasterxml.jackson.annotation.JsonIgnoreProperties;
import jakarta.persistence.*;
import lombok.Data;

@Data
@Entity
@Table(name = "facturas")
public class Factura {
    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    private Long id;

    private String numero;

    private Double totalFactura;

    @ManyToOne(fetch = FetchType.EAGER)
    @JoinColumn(name = "proveedor_id")
    @JsonIgnoreProperties("facturas")
    private Proveedor proveedor;
}
```

6.4. Arquitectura

Misma estructura que A.



```
EXAMENFINALDESARROLLO
  > componente-a
  v componente-b
    > .mvn
    v src
      v main
        v java\com\empresa\b
          > config
          > controller
          > model
          > repository
          > service
            ComponenteBApplication.java
        > resources
      > test
    > target
      .gitattributes
      .gitignore
      HELP.md
      mvnw
      mvnw.cmd
      pom.xml
      server_logs.txt
      start-server.bat
      start-server.ps1
```

7. COMPONENTE C – LIBRERÍA COMPARTIDA

7.1. POM.XML

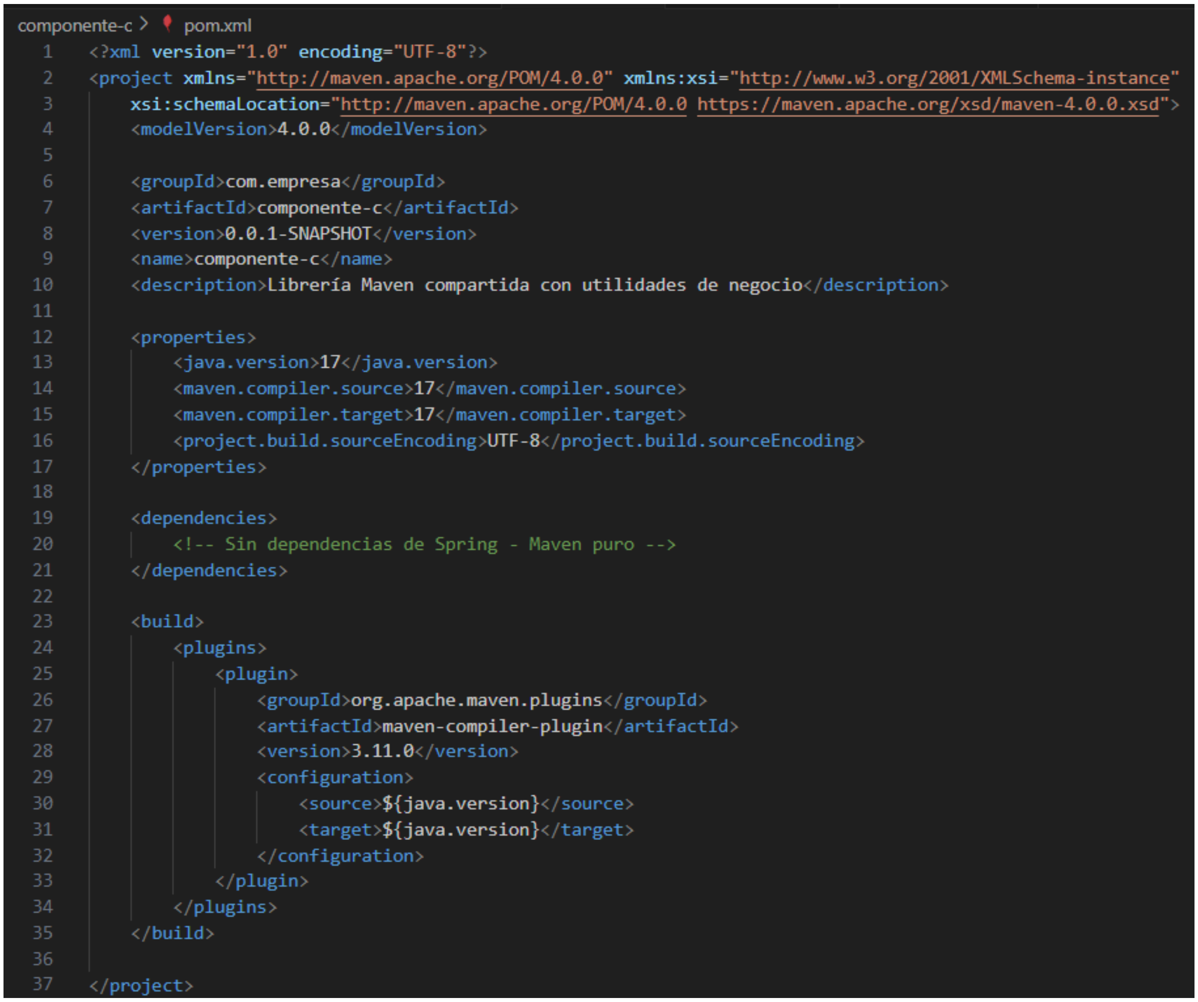
Proyecto Maven puro (sin Spring Boot)

GroupId: com.empresa

ArtifactId: componente-c

Sin dependencias externas

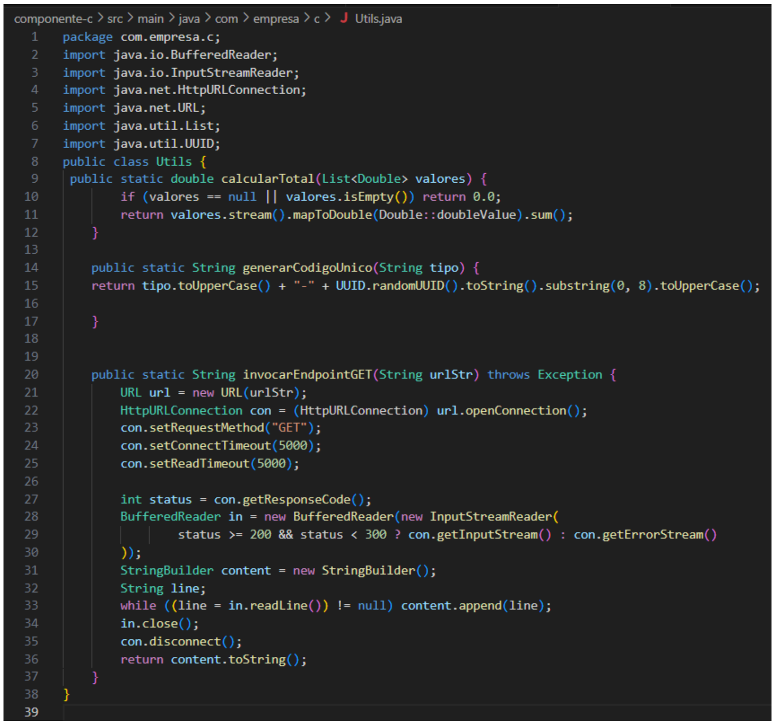
Compilación Java 17



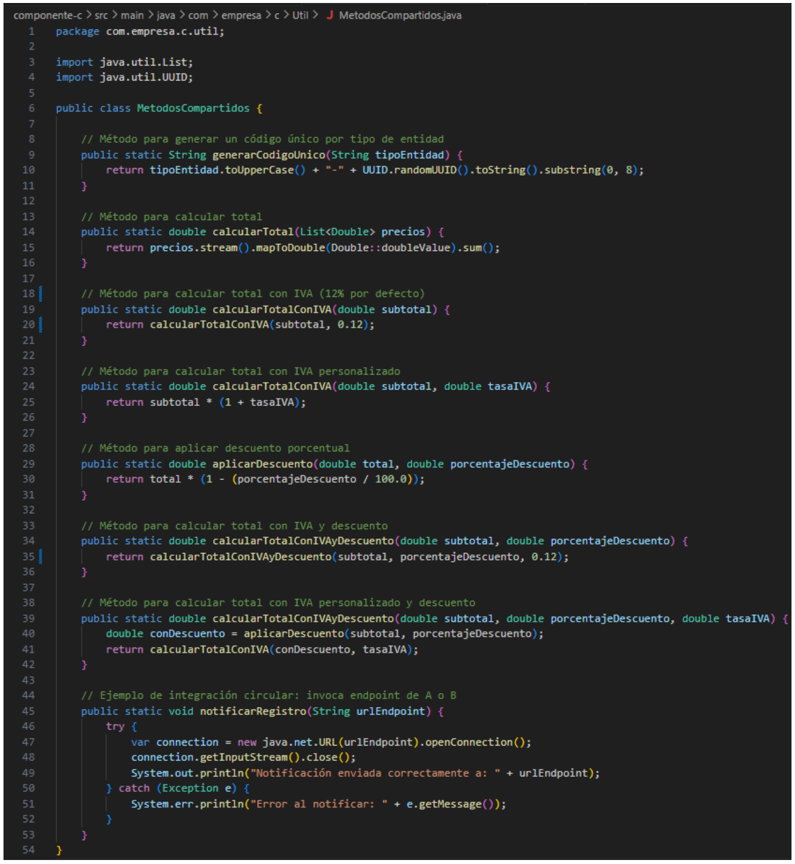
```xml
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 https://maven.apache.org/xsd/maven-4.0.0.xsd">
    <modelVersion>4.0.0</modelVersion>

    <groupId>com.empresa</groupId>
    <artifactId>componente-c</artifactId>
    <version>0.0.1-SNAPSHOT</version>
    <name>componente-c</name>
    <description>Librería Maven compartida con utilidades de negocio</description>

    <properties>
        <java.version>17</java.version>
        <maven.compiler.source>17</maven.compiler.source>
        <maven.compiler.target>17</maven.compiler.target>
        <project.build.sourceEncoding>UTF-8</project.build.sourceEncoding>
    </properties>

    <dependencies>
        <!-- Sin dependencias de Spring - Maven puro -->
    </dependencies>

    <build>
        <plugins>
            <plugin>
                <groupId>org.apache.maven.plugins</groupId>
                <artifactId>maven-compiler-plugin</artifactId>
                <version>3.11.0</version>
                <configuration>
                    <source>${java.version}</source>
                    <target>${java.version}</target>
                </configuration>
            </plugin>
        </plugins>
    </build>

</project>
```

7.2. Clases Utilitarias

Métodos de validación, formateo y cálculos compartidos entre Componentes A y B.


componente-c > src > main > java > com > empresa > c > J Utils.java

```java
package com.empresa.c;
import java.io.BufferedReader;
import java.io.InputStreamReader;
import java.net.HttpURLConnection;
import java.net.URL;
import java.util.List;
import java.util.UUID;
public class Utils {
 public static double calcularTotal(List<Double> valores) {
        if (valores == null || valores.isEmpty()) return 0.0;
        return valores.stream().mapToDouble(Double::doubleValue).sum();
    }

    public static String generarCodigoUnico(String tipo) {
    return tipo.toUpperCase() + "-" + UUID.randomUUID().toString().substring(0, 8).toUpperCase();

    }


    public static String invocarEndpointGET(String urlStr) throws Exception {
        URL url = new URL(urlStr);
        HttpURLConnection con = (HttpURLConnection) url.openConnection();
        con.setRequestMethod("GET");
        con.setConnectTimeout(5000);
        con.setReadTimeout(5000);

        int status = con.getResponseCode();
        BufferedReader in = new BufferedReader(new InputStreamReader(
                status >= 200 && status < 300 ? con.getInputStream() : con.getErrorStream()
        ));
        StringBuilder content = new StringBuilder();
        String line;
        while ((line = in.readLine()) != null) content.append(line);
        in.close();
        con.disconnect();
        return content.toString();
    }
}
```

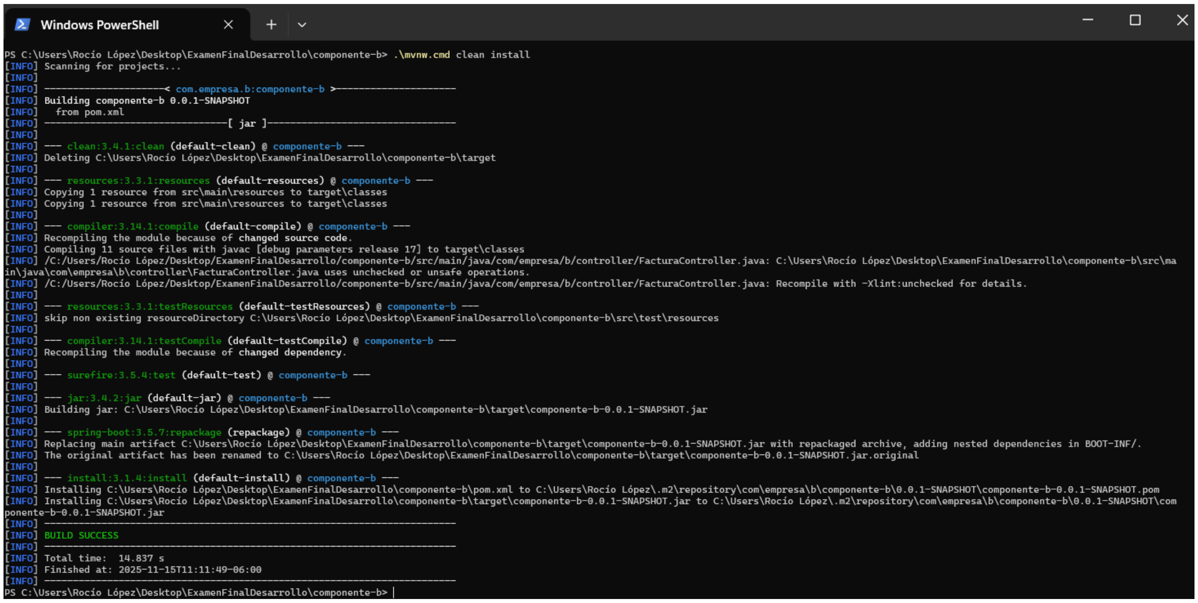

componente-c > src > main > java > com > empresa > c > Util > J MetodosCompartidos.java

```java
package com.empresa.c.util;

import java.util.List;
import java.util.UUID;

public class MetodosCompartidos {

    // Método para generar un código único por tipo de entidad
    public static String generarCodigoUnico(String tipoEntidad) {
        return tipoEntidad.toUpperCase() + "-" + UUID.randomUUID().toString().substring(0, 8);
    }

    // Método para calcular total
    public static double calcularTotal(List<Double> precios) {
        return precios.stream().mapToDouble(Double::doubleValue).sum();
    }

    // Método para calcular total con IVA (12% por defecto)
    public static double calcularTotalConIVA(double subtotal) {
        return calcularTotalConIVA(subtotal, 0.12);
    }

    // Método para calcular total con IVA personalizado
    public static double calcularTotalConIVA(double subtotal, double tasaIVA) {
        return subtotal * (1 + tasaIVA);
    }

    // Método para aplicar descuento porcentual
    public static double aplicarDescuento(double total, double porcentajeDescuento) {
        return total * (1 - (porcentajeDescuento / 100.0));
    }

    // Método para calcular total con IVA y descuento
    public static double calcularTotalConIVAyDescuento(double subtotal, double porcentajeDescuento) {
        return calcularTotalConIVAyDescuento(subtotal, porcentajeDescuento, 0.12);
    }

    // Método para calcular total con IVA personalizado y descuento
    public static double calcularTotalConIVAyDescuento(double subtotal, double porcentajeDescuento, double tasaIVA) {
        double conDescuento = aplicarDescuento(subtotal, porcentajeDescuento);
        return calcularTotalConIVA(conDescuento, tasaIVA);
    }

    // Ejemplo de integración circular: invoca endpoint de A o B
    public static void notificarRegistro(String urlEndpoint) {
        try {
            var connection = new java.net.URL(urlEndpoint).openConnection();
            connection.getInputStream().close();
            System.out.println("Notificación enviada correctamente a: " + urlEndpoint);
        } catch (Exception e) {
            System.err.println("Error al notificar: " + e.getMessage());
        }
    }
}
```

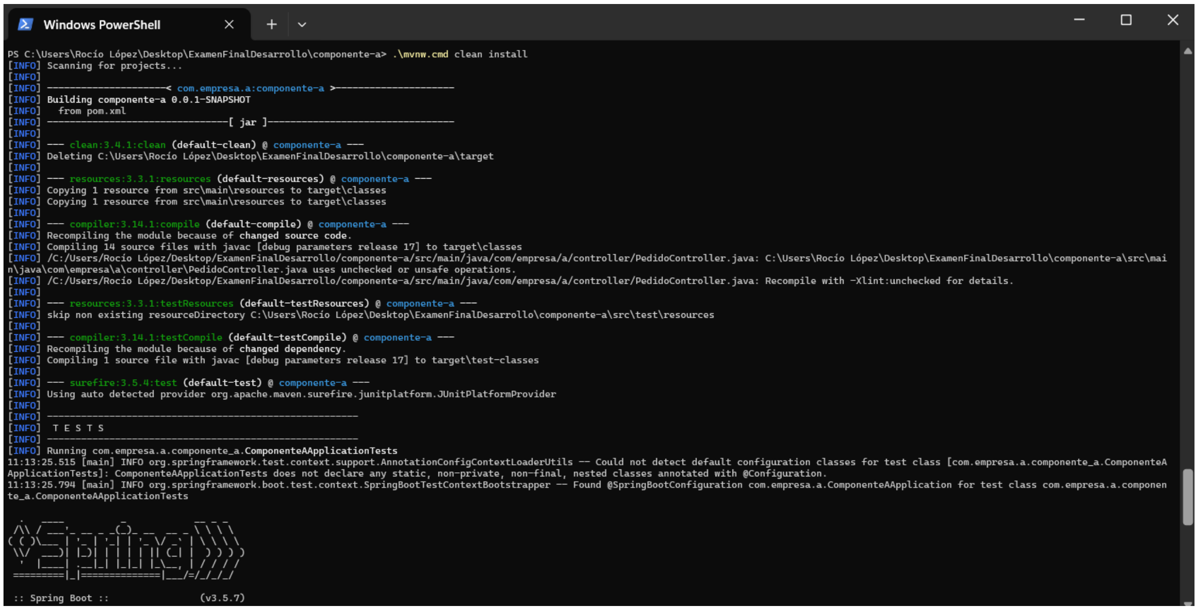
7.3. Maven Install

Instala el JAR en ~/.m2/repository/

componentes A y B



```
PS C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-b> .\mvnw.cmd clean install
[INFO] Scanning for projects...
[INFO]
[INFO] --------------------< com.empresa.b:componente-b >---------------------
[INFO] Building componente-b 0.0.1-SNAPSHOT
[INFO]   from pom.xml
[INFO] --------------------------------[ jar ]---------------------------------
[INFO]
[INFO] --- clean:3.4.1:clean (default-clean) @ componente-b ---
[INFO] Deleting C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-b\target
[INFO]
[INFO] --- resources:3.3.1:resources (default-resources) @ componente-b ---
[INFO] Copying 1 resource from src\main\resources to target\classes
[INFO] Copying 1 resource from src\main\resources to target\classes
[INFO]
[INFO] --- compiler:3.14.1:compile (default-compile) @ componente-b ---
[INFO] Recompiling the module because of changed source code.
[INFO] Compiling 11 source files with javac [debug parameters release 17] to target\classes
[INFO] /C:/Users/Rocío López/Desktop/ExamenFinalDesarrollo/componente-b/src/main/java/com/empresa/b/controller/FacturaController.java: C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-b\src\ma
in\java\com\empresa\b\controller\FacturaController.java uses unchecked or unsafe operations.
[INFO] /C:/Users/Rocío López/Desktop/ExamenFinalDesarrollo/componente-b/src/main/java/com/empresa/b/controller/FacturaController.java: Recompile with -Xlint:unchecked for details.
[INFO]
[INFO] --- resources:3.3.1:testResources (default-testResources) @ componente-b ---
[INFO] skip non existing resourceDirectory C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-b\src\test\resources
[INFO]
[INFO] --- compiler:3.14.1:testCompile (default-testCompile) @ componente-b ---
[INFO] Recompiling the module because of changed dependency.
[INFO]
[INFO] --- surefire:3.5.4:test (default-test) @ componente-b ---
[INFO]
[INFO] --- jar:3.4.2:jar (default-jar) @ componente-b ---
[INFO] Building jar: C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-b\target\componente-b-0.0.1-SNAPSHOT.jar
[INFO]
[INFO] --- spring-boot:3.5.7:repackage (repackage) @ componente-b ---
[INFO] Replacing main artifact C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-b\target\componente-b-0.0.1-SNAPSHOT.jar with repackaged archive, adding nested dependencies in BOOT-INF/.
[INFO] The original artifact has been renamed to C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-b\target\componente-b-0.0.1-SNAPSHOT.jar.original
[INFO]
[INFO] --- install:3.1.4:install (default-install) @ componente-b ---
[INFO] Installing C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-b\pom.xml to C:\Users\Rocío López\.m2\repository\com\empresa\b\componente-b\0.0.1-SNAPSHOT\componente-b-0.0.1-SNAPSHOT.pom
[INFO] Installing C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-b\target\componente-b-0.0.1-SNAPSHOT.jar to C:\Users\Rocío López\.m2\repository\com\empresa\b\componente-b\0.0.1-SNAPSHOT\com
ponente-b-0.0.1-SNAPSHOT.jar
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  14.837 s
[INFO] Finished at: 2025-11-15T11:11:49-06:00
[INFO] ------------------------------------------------------------------------
PS C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-b> |
```



```
PS C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-a> .\mvnw.cmd clean install
[INFO] Scanning for projects...
[INFO]
[INFO] --------------------< com.empresa.a:componente-a >---------------------
[INFO] Building componente-a 0.0.1-SNAPSHOT
[INFO]   from pom.xml
[INFO] --------------------------------[ jar ]---------------------------------
[INFO]
[INFO] --- clean:3.4.1:clean (default-clean) @ componente-a ---
[INFO] Deleting C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-a\target
[INFO]
[INFO] --- resources:3.3.1:resources (default-resources) @ componente-a ---
[INFO] Copying 1 resource from src\main\resources to target\classes
[INFO] Copying 1 resource from src\main\resources to target\classes
[INFO]
[INFO] --- compiler:3.14.1:compile (default-compile) @ componente-a ---
[INFO] Recompiling the module because of changed source code.
[INFO] Compiling 14 source files with javac [debug parameters release 17] to target\classes
[INFO] /C:/Users/Rocío López/Desktop/ExamenFinalDesarrollo/componente-a/src/main/java/com/empresa/a/controller/PedidoController.java: C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-a\src\mai
n\java\com\empresa\a\controller\PedidoController.java uses unchecked or unsafe operations.
[INFO] /C:/Users/Rocío López/Desktop/ExamenFinalDesarrollo/componente-a/src/main/java/com/empresa/a/controller/PedidoController.java: Recompile with -Xlint:unchecked for details.
[INFO]
[INFO] --- resources:3.3.1:testResources (default-testResources) @ componente-a ---
[INFO] skip non existing resourceDirectory C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-a\src\test\resources
[INFO]
[INFO] --- compiler:3.14.1:testCompile (default-testCompile) @ componente-a ---
[INFO] Recompiling the module because of changed dependency.
[INFO] Compiling 1 source file with javac [debug parameters release 17] to target\test-classes
[INFO]
[INFO] --- surefire:3.5.4:test (default-test) @ componente-a ---
[INFO] Using auto detected provider org.apache.maven.surefire.junitplatform.JUnitPlatformProvider
[INFO]
[INFO] -------------------------------------------------------
[INFO]  T E S T S
[INFO] -------------------------------------------------------
[INFO] Running com.empresa.a.componente_a.ComponenteAApplicationTests
11:13:25.515 [main] INFO org.springframework.test.context.support.AnnotationConfigContextLoaderUtils -- Could not detect default configuration classes for test class [com.empresa.a.componente_a.ComponenteA
ApplicationTests]: ComponenteAApplicationTests does not declare any static, non-private, non-final, nested classes annotated with @Configuration.
11:13:25.794 [main] INFO org.springframework.boot.test.context.SpringBootTestContextBootstrapper -- Found @SpringBootConfiguration com.empresa.a.ComponenteAApplication for test class com.empresa.a.componen
te_a.ComponenteAApplicationTests

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 \\/  ___)| |_)| | | | | || (_| |  ) ) ) )
  '  |____| .__|_| |_|_| |_\__, | / / / /
 =========|_|==============|___/=/_/_/_/

 :: Spring Boot ::                (v3.5.7)
```
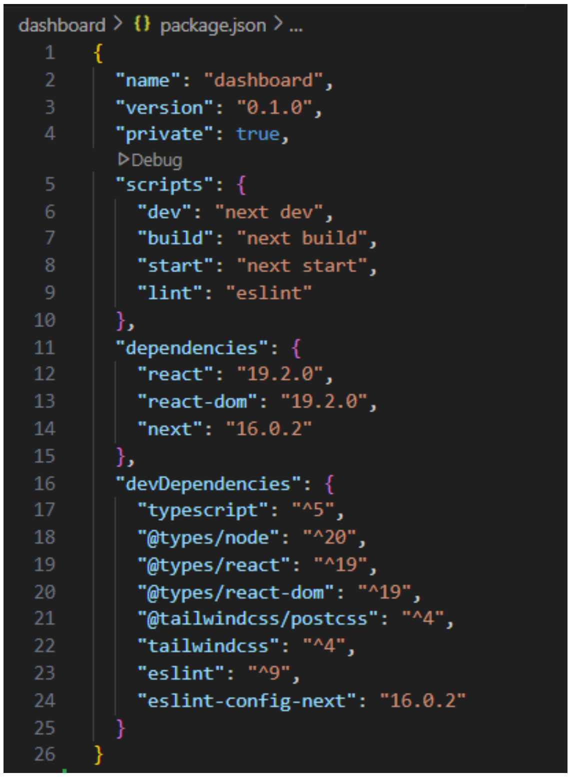

8. DASHBOARD FRONTEND

8.1. Configuración

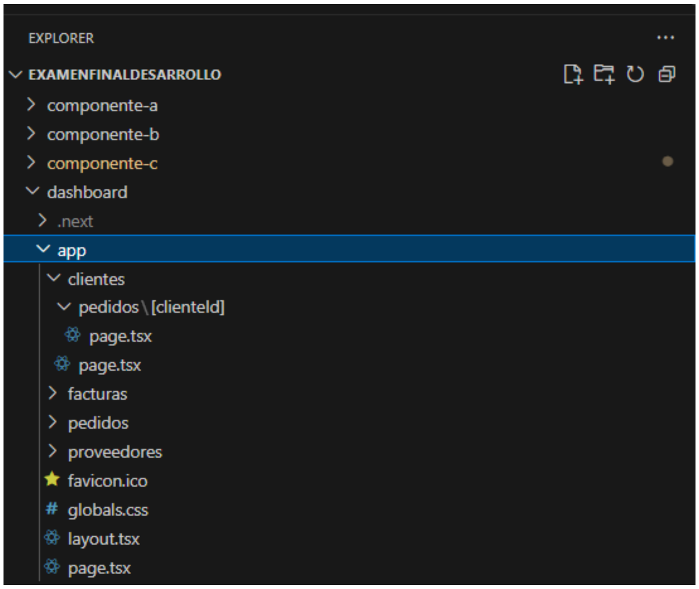
Next.js 16.0.2, React 19, TypeScript, Tailwind CSS



```json
{
  "name": "dashboard",
  "version": "0.1.0",
  "private": true,
  "scripts": {
    "dev": "next dev",
    "build": "next build",
    "start": "next start",
    "lint": "eslint"
  },
  "dependencies": {
    "react": "19.2.0",
    "react-dom": "19.2.0",
    "next": "16.0.2"
  },
  "devDependencies": {
    "typescript": "^5",
    "@types/node": "^20",
    "@types/react": "^19",
    "@types/react-dom": "^19",
    "@tailwindcss/postcss": "^4",
    "tailwindcss": "^4",
    "eslint": "^9",
    "eslint-config-next": "16.0.2"
  }
}
```

8.2. Estructura de Rutas

- App Router de Next.js: /clientes, /pedidos, /proveedores, /facturas
- Rutas dinámicas: /pedidos/info/[id]



```
EXAMENFINALDESARROLLO
  > componente-a
  > componente-b
  > componente-c
  v dashboard
    > .next
    v app
      v clientes
        v pedidos \ [clienteId]
            page.tsx
          page.tsx
      > facturas
      > pedidos
      > proveedores
        favicon.ico
        globals.css
        layout.tsx
        page.tsx
```

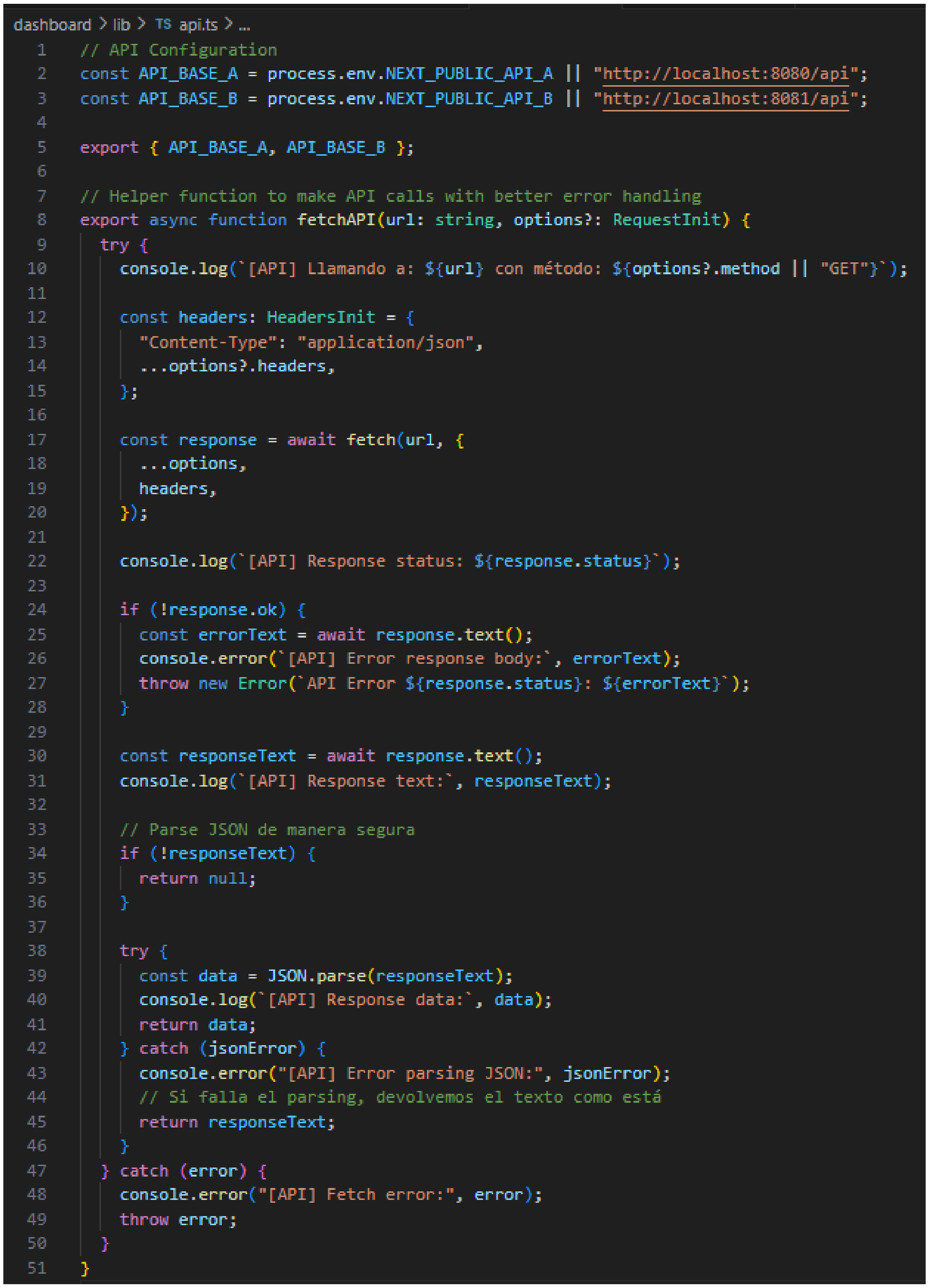
8.3. Servicios API

Funciones fetch para consumir APIs:

fetchClientes() → localhost:8080/api/clientes

fetchProveedores() → localhost:8081/api/proveedores

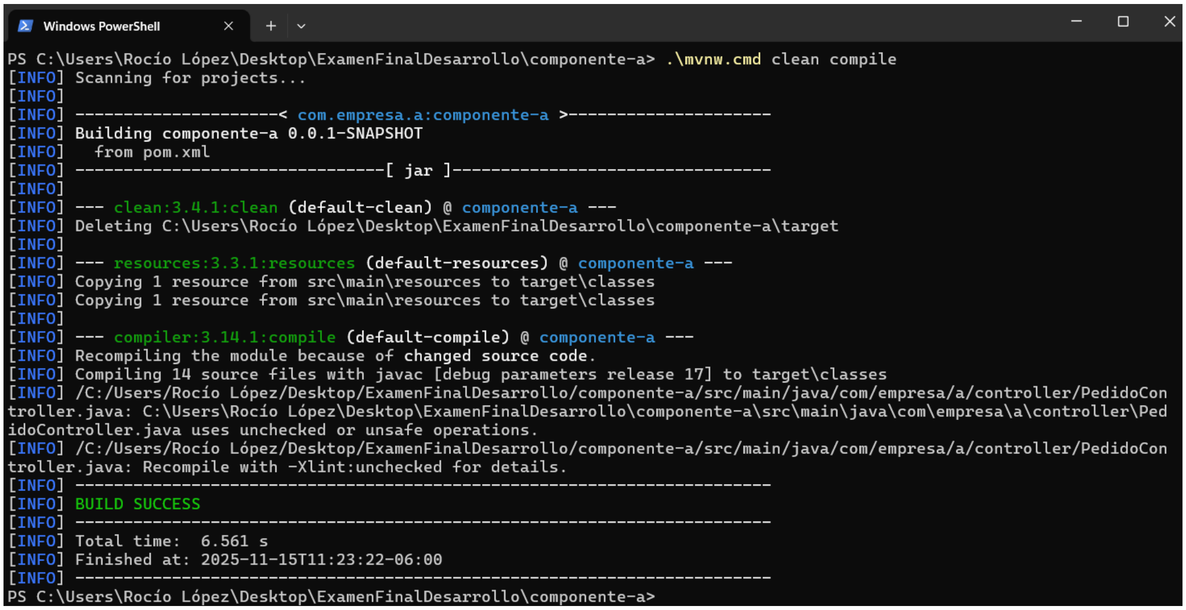
CRUD completo (GET, POST, PUT, DELETE)



```typescript
// API Configuration
const API_BASE_A = process.env.NEXT_PUBLIC_API_A || "http://localhost:8080/api";
const API_BASE_B = process.env.NEXT_PUBLIC_API_B || "http://localhost:8081/api";

export { API_BASE_A, API_BASE_B };

// Helper function to make API calls with better error handling
export async function fetchAPI(url: string, options?: RequestInit) {
  try {
    console.log(`[API] Llamando a: ${url} con método: ${options?.method || "GET"}`);

    const headers: HeadersInit = {
      "Content-Type": "application/json",
      ...options?.headers,
    };

    const response = await fetch(url, {
      ...options,
      headers,
    });

    console.log(`[API] Response status: ${response.status}`);

    if (!response.ok) {
      const errorText = await response.text();
      console.error(`[API] Error response body:`, errorText);
      throw new Error(`API Error ${response.status}: ${errorText}`);
    }

    const responseText = await response.text();
    console.log(`[API] Response text:`, responseText);

    // Parse JSON de manera segura
    if (!responseText) {
      return null;
    }

    try {
      const data = JSON.parse(responseText);
      console.log(`[API] Response data:`, data);
      return data;
    } catch (jsonError) {
      console.error("[API] Error parsing JSON:", jsonError);
      // Si falla el parsing, devolvemos el texto como está
      return responseText;
    }
  } catch (error) {
    console.error("[API] Fetch error:", error);
    throw error;
  }
}
```

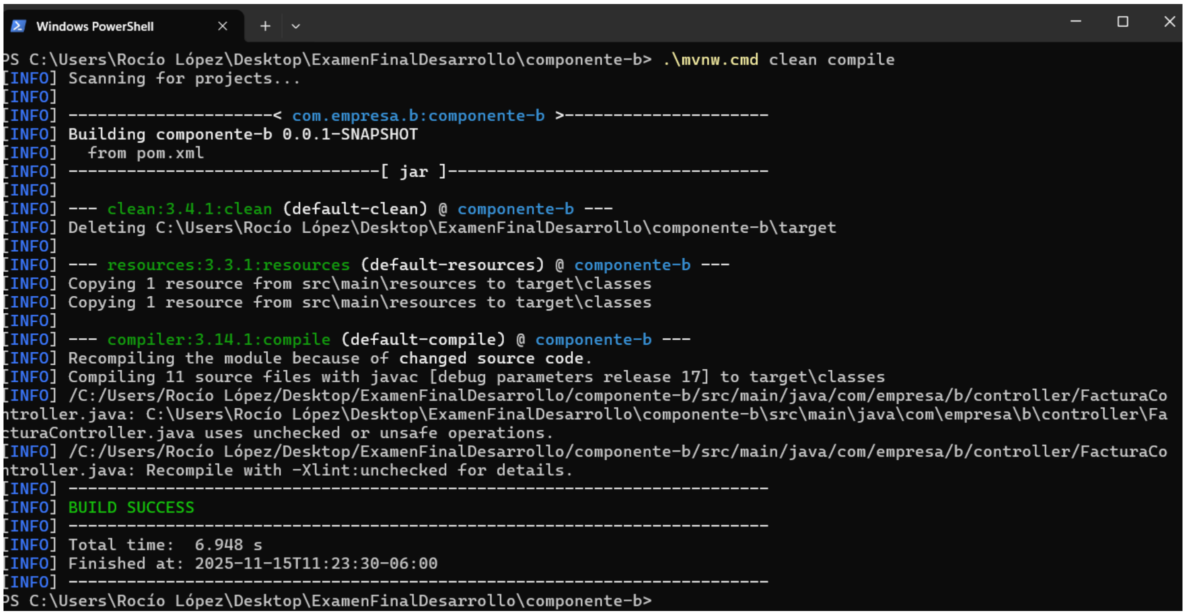
9. COMPILACIÓN Y EJECUCIÓN

9.1. Componente A



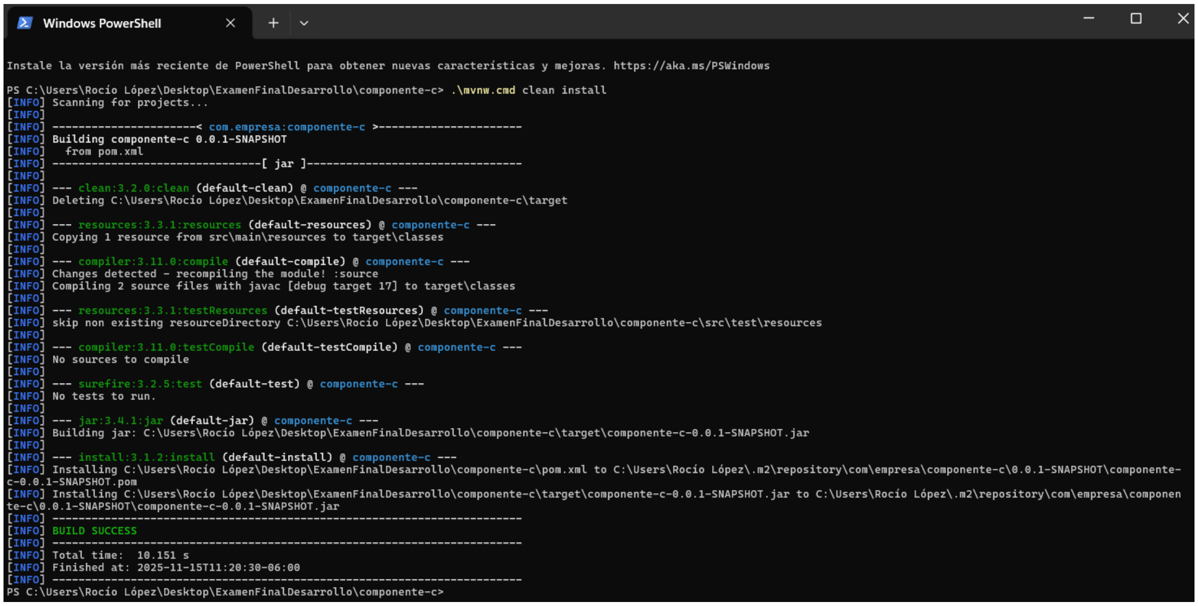
```
PS C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-a> .\mvnw.cmd clean compile
[INFO] Scanning for projects...
[INFO]
[INFO] --------------------< com.empresa.a:componente-a >---------------------
[INFO] Building componente-a 0.0.1-SNAPSHOT
[INFO]   from pom.xml
[INFO] --------------------------------[ jar ]---------------------------------
[INFO]
[INFO] --- clean:3.4.1:clean (default-clean) @ componente-a ---
[INFO] Deleting C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-a\target
[INFO]
[INFO] --- resources:3.3.1:resources (default-resources) @ componente-a ---
[INFO] Copying 1 resource from src\main\resources to target\classes
[INFO] Copying 1 resource from src\main\resources to target\classes
[INFO]
[INFO] --- compiler:3.14.1:compile (default-compile) @ componente-a ---
[INFO] Recompiling the module because of changed source code.
[INFO] Compiling 14 source files with javac [debug parameters release 17] to target\classes
[INFO] /C:/Users/Rocío López/Desktop/ExamenFinalDesarrollo/componente-a/src/main/java/com/empresa/a/controller/PedidoCon
troller.java: C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-a\src\main\java\com\empresa\a\controller\Ped
idoController.java uses unchecked or unsafe operations.
[INFO] /C:/Users/Rocío López/Desktop/ExamenFinalDesarrollo/componente-a/src/main/java/com/empresa/a/controller/PedidoCon
troller.java: Recompile with -Xlint:unchecked for details.
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  6.561 s
[INFO] Finished at: 2025-11-15T11:23:22-06:00
[INFO] ------------------------------------------------------------------------
PS C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-a>
```

9.2. Componente B



```
PS C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-b> .\mvnw.cmd clean compile
[INFO] Scanning for projects...
[INFO]
[INFO] --------------------< com.empresa.b:componente-b >---------------------
[INFO] Building componente-b 0.0.1-SNAPSHOT
[INFO]   from pom.xml
[INFO] --------------------------------[ jar ]---------------------------------
[INFO]
[INFO] --- clean:3.4.1:clean (default-clean) @ componente-b ---
[INFO] Deleting C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-b\target
[INFO]
[INFO] --- resources:3.3.1:resources (default-resources) @ componente-b ---
[INFO] Copying 1 resource from src\main\resources to target\classes
[INFO] Copying 1 resource from src\main\resources to target\classes
[INFO]
[INFO] --- compiler:3.14.1:compile (default-compile) @ componente-b ---
[INFO] Recompiling the module because of changed source code.
[INFO] Compiling 11 source files with javac [debug parameters release 17] to target\classes
[INFO] /C:/Users/Rocío López/Desktop/ExamenFinalDesarrollo/componente-b/src/main/java/com/empresa/b/controller/FacturaCo
ntroller.java: C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-b\src\main\java\com\empresa\b\controller\Fa
cturaController.java uses unchecked or unsafe operations.
[INFO] /C:/Users/Rocío López/Desktop/ExamenFinalDesarrollo/componente-b/src/main/java/com/empresa/b/controller/FacturaCo
ntroller.java: Recompile with -Xlint:unchecked for details.
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  6.948 s
[INFO] Finished at: 2025-11-15T11:23:30-06:00
[INFO] ------------------------------------------------------------------------
PS C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-b>
```

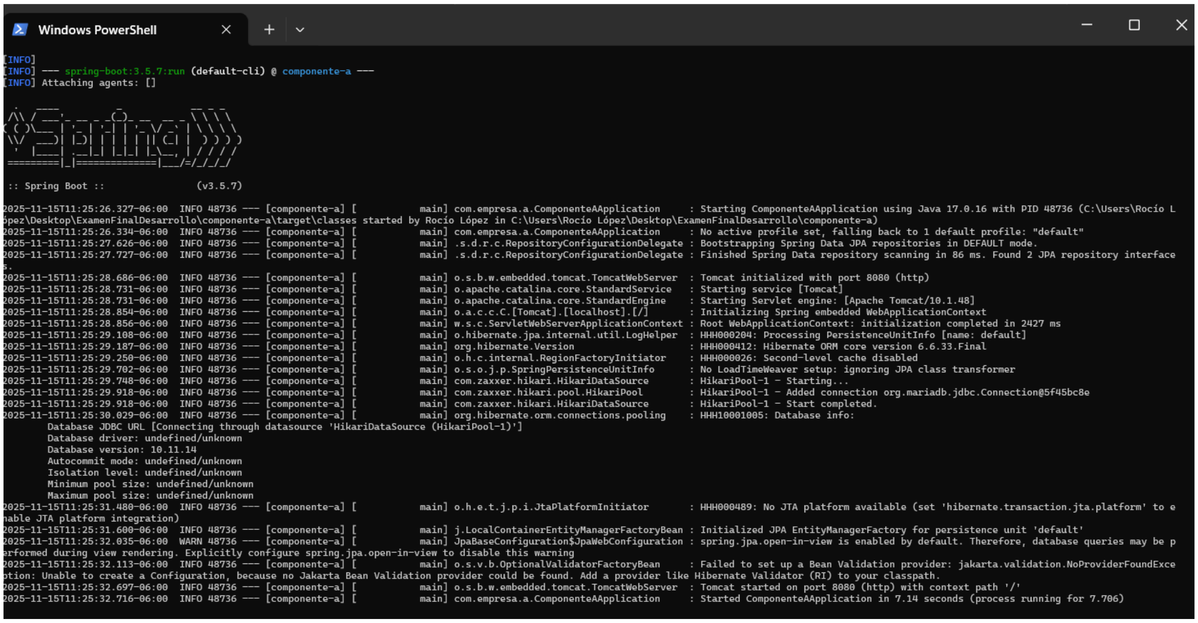
9.3. Componente C



```
Instale la versión más reciente de PowerShell para obtener nuevas características y mejoras. https://aka.ms/PSWindows

PS C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-c> .\mvnw.cmd clean install
[INFO] Scanning for projects...
[INFO]
[INFO] ----------------------< com.empresa:componente-c >----------------------
[INFO] Building componente-c 0.0.1-SNAPSHOT
[INFO]   from pom.xml
[INFO] --------------------------------[ jar ]---------------------------------
[INFO]
[INFO] --- clean:3.2.0:clean (default-clean) @ componente-c ---
[INFO] Deleting C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-c\target
[INFO]
[INFO] --- resources:3.3.1:resources (default-resources) @ componente-c ---
[INFO] Copying 1 resource from src\main\resources to target\classes
[INFO]
[INFO] --- compiler:3.11.0:compile (default-compile) @ componente-c ---
[INFO] Changes detected - recompiling the module! :source
[INFO] Compiling 2 source files with javac [debug target 17] to target\classes
[INFO]
[INFO] --- resources:3.3.1:testResources (default-testResources) @ componente-c ---
[INFO] skip non existing resourceDirectory C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-c\src\test\resources
[INFO]
[INFO] --- compiler:3.11.0:testCompile (default-testCompile) @ componente-c ---
[INFO] No sources to compile
[INFO]
[INFO] --- surefire:3.2.5:test (default-test) @ componente-c ---
[INFO] No tests to run.
[INFO]
[INFO] --- jar:3.4.1:jar (default-jar) @ componente-c ---
[INFO] Building jar: C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-c\target\componente-c-0.0.1-SNAPSHOT.jar
[INFO]
[INFO] --- install:3.1.2:install (default-install) @ componente-c ---
[INFO] Installing C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-c\pom.xml to C:\Users\Rocío López\.m2\repository\com\empresa\componente-c\0.0.1-SNAPSHOT\componente-
c-0.0.1-SNAPSHOT.pom
[INFO] Installing C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-c\target\componente-c-0.0.1-SNAPSHOT.jar to C:\Users\Rocío López\.m2\repository\com\empresa\componen
te-c\0.0.1-SNAPSHOT\componente-c-0.0.1-SNAPSHOT.jar
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  10.151 s
[INFO] Finished at: 2025-11-15T11:20:30-06:00
[INFO] ------------------------------------------------------------------------
PS C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-c>
```

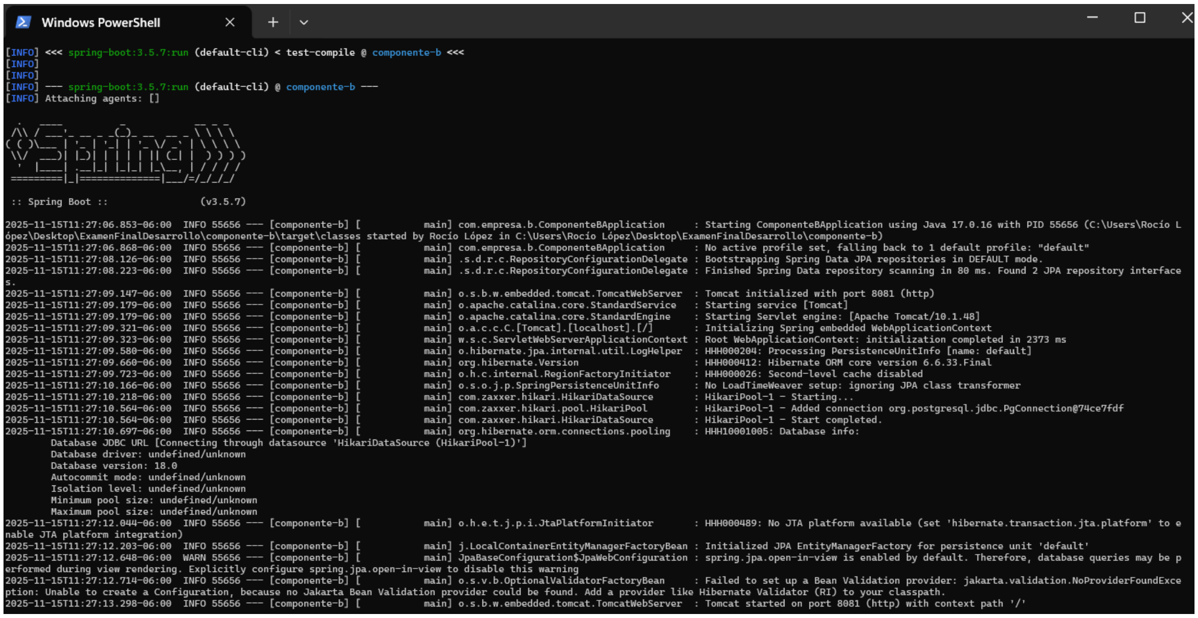
9.4. Backend

Componente A - .\mvnw.cmd spring-boot:run



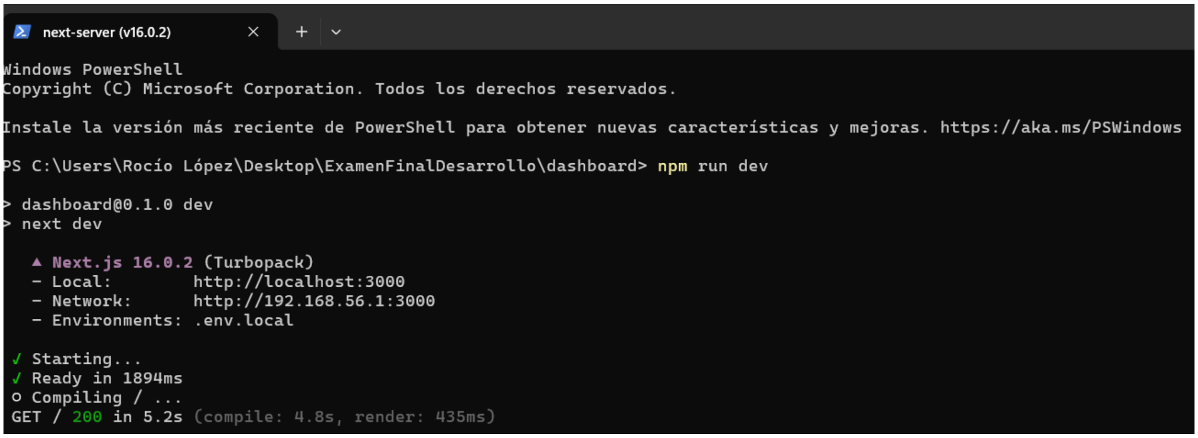
```
[INFO]
[INFO] --- spring-boot:3.5.7:run (default-cli) @ componente-a ---
[INFO] Attaching agents: []

  .   ____          _            __ _ _
 /\\ / ___'_ __ _ _(_)_ __  __ _ \ \ \ \
( ( )\___ | '_ | '_| | '_ \/ _` | \ \ \ \
 \\/  ___)| |_)| | | | | || (_| |  ) ) ) )
  '  |____| .__|_| |_|_| |_\__, | / / / /
 =========|_|==============|___/=/_/_/_/

 :: Spring Boot ::                (v3.5.7)

2025-11-15T11:25:26.327-06:00  INFO 48736 --- [componente-a] [           main] com.empresa.a.ComponenteAApplication     : Starting ComponenteAApplication using Java 17.0.16 with PID 48736 (C:\Users\Rocío L
ópez\Desktop\ExamenFinalDesarrollo\componente-a\target\classes started by Rocío López in C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-a)
2025-11-15T11:25:26.334-06:00  INFO 48736 --- [componente-a] [           main] com.empresa.a.ComponenteAApplication     : No active profile set, falling back to 1 default profile: "default"
2025-11-15T11:25:27.626-06:00  INFO 48736 --- [componente-a] [           main] .s.d.r.c.RepositoryConfigurationDelegate : Bootstrapping Spring Data JPA repositories in DEFAULT mode.
2025-11-15T11:25:27.727-06:00  INFO 48736 --- [componente-a] [           main] .s.d.r.c.RepositoryConfigurationDelegate : Finished Spring Data repository scanning in 86 ms. Found 2 JPA repository interface
s.
2025-11-15T11:25:28.686-06:00  INFO 48736 --- [componente-a] [           main] o.s.b.w.embedded.tomcat.TomcatWebServer  : Tomcat initialized with port 8080 (http)
2025-11-15T11:25:28.731-06:00  INFO 48736 --- [componente-a] [           main] o.apache.catalina.core.StandardService   : Starting service [Tomcat]
2025-11-15T11:25:28.731-06:00  INFO 48736 --- [componente-a] [           main] o.apache.catalina.core.StandardEngine    : Starting Servlet engine: [Apache Tomcat/10.1.48]
2025-11-15T11:25:28.854-06:00  INFO 48736 --- [componente-a] [           main] o.a.c.c.C.[Tomcat].[localhost].[/]       : Initializing Spring embedded WebApplicationContext
2025-11-15T11:25:28.856-06:00  INFO 48736 --- [componente-a] [           main] w.s.c.ServletWebServerApplicationContext : Root WebApplicationContext: initialization completed in 2427 ms
2025-11-15T11:25:29.108-06:00  INFO 48736 --- [componente-a] [           main] o.hibernate.jpa.internal.util.LogHelper  : HHH000204: Processing PersistenceUnitInfo [name: default]
2025-11-15T11:25:29.187-06:00  INFO 48736 --- [componente-a] [           main] org.hibernate.Version                    : HHH000412: Hibernate ORM core version 6.6.33.Final
2025-11-15T11:25:29.250-06:00  INFO 48736 --- [componente-a] [           main] o.h.c.internal.RegionFactoryInitiator    : HHH000026: Second-level cache disabled
2025-11-15T11:25:29.702-06:00  INFO 48736 --- [componente-a] [           main] o.s.o.j.p.SpringPersistenceUnitInfo      : No LoadTimeWeaver setup: ignoring JPA class transformer
2025-11-15T11:25:29.748-06:00  INFO 48736 --- [componente-a] [           main] com.zaxxer.hikari.HikariDataSource       : HikariPool-1 - Starting...
2025-11-15T11:25:29.918-06:00  INFO 48736 --- [componente-a] [           main] com.zaxxer.hikari.pool.HikariPool        : HikariPool-1 - Added connection org.mariadb.jdbc.Connection@5f45bc8e
2025-11-15T11:25:29.918-06:00  INFO 48736 --- [componente-a] [           main] com.zaxxer.hikari.HikariDataSource       : HikariPool-1 - Start completed.
2025-11-15T11:25:30.029-06:00  INFO 48736 --- [componente-a] [           main] org.hibernate.orm.connections.pooling    : HHH10001005: Database info:
        Database JDBC URL [Connecting through datasource 'HikariDataSource (HikariPool-1)']
        Database driver: undefined/unknown
        Database version: 10.11.14
        Autocommit mode: undefined/unknown
        Isolation level: undefined/unknown
        Minimum pool size: undefined/unknown
        Maximum pool size: undefined/unknown
2025-11-15T11:25:31.480-06:00  INFO 48736 --- [componente-a] [           main] o.h.e.t.j.p.i.JtaPlatformInitiator       : HHH000489: No JTA platform available (set 'hibernate.transaction.jta.platform' to e
nable JTA platform integration)
2025-11-15T11:25:31.600-06:00  INFO 48736 --- [componente-a] [           main] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'
2025-11-15T11:25:32.035-06:00  WARN 48736 --- [componente-a] [           main] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by default. Therefore, database queries may be p
erformed during view rendering. Explicitly configure spring.jpa.open-in-view to disable this warning
2025-11-15T11:25:32.113-06:00  INFO 48736 --- [componente-a] [           main] o.s.v.b.OptionalValidatorFactoryBean     : Failed to set up a Bean Validation provider: jakarta.validation.NoProviderFoundExce
ption: Unable to create a Configuration, because no Jakarta Bean Validation provider could be found. Add a provider like Hibernate Validator (RI) to your classpath.
2025-11-15T11:25:32.697-06:00  INFO 48736 --- [componente-a] [           main] o.s.b.w.embedded.tomcat.TomcatWebServer  : Tomcat started on port 8080 (http) with context path '/'
2025-11-15T11:25:32.716-06:00  INFO 48736 --- [componente-a] [           main] com.empresa.a.ComponenteAApplication     : Started ComponenteAApplication in 7.14 seconds (process running for 7.706)
```

Componente B – .\mvnw.cmd spring-boot:run



```
[INFO] <<< spring-boot:3.5.7:run (default-cli) < test-compile @ componente-b <<<
[INFO]
[INFO]
[INFO] --- spring-boot:3.5.7:run (default-cli) @ componente-b ---
[INFO] Attaching agents: []

  .   ____          _            __ _ _
 /\\ / ___'_ __ _ _(_)_ __  __ _ \ \ \ \
( ( )\___ | '_ | '_| | '_ \/ _` | \ \ \ \
 \\/  ___)| |_)| | | | | || (_| |  ) ) ) )
  '  |____| .__|_| |_|_| |_\__, | / / / /
 =========|_|==============|___/=/_/_/_/

 :: Spring Boot ::                (v3.5.7)

2025-11-15T11:27:06.853-06:00  INFO 55656 --- [componente-b] [           main] com.empresa.b.ComponenteBApplication     : Starting ComponenteBApplication using Java 17.0.16 with PID 55656 (C:\Users\Rocío L
ópez\Desktop\ExamenFinalDesarrollo\componente-b\target\classes started by Rocío López in C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-b)
2025-11-15T11:27:06.868-06:00  INFO 55656 --- [componente-b] [           main] com.empresa.b.ComponenteBApplication     : No active profile set, falling back to 1 default profile: "default"
2025-11-15T11:27:08.126-06:00  INFO 55656 --- [componente-b] [           main] .s.d.r.c.RepositoryConfigurationDelegate : Bootstrapping Spring Data JPA repositories in DEFAULT mode.
2025-11-15T11:27:08.223-06:00  INFO 55656 --- [componente-b] [           main] .s.d.r.c.RepositoryConfigurationDelegate : Finished Spring Data repository scanning in 80 ms. Found 2 JPA repository interface
s.
2025-11-15T11:27:09.147-06:00  INFO 55656 --- [componente-b] [           main] o.s.b.w.embedded.tomcat.TomcatWebServer  : Tomcat initialized with port 8081 (http)
2025-11-15T11:27:09.179-06:00  INFO 55656 --- [componente-b] [           main] o.apache.catalina.core.StandardService   : Starting service [Tomcat]
2025-11-15T11:27:09.179-06:00  INFO 55656 --- [componente-b] [           main] o.apache.catalina.core.StandardEngine    : Starting Servlet engine: [Apache Tomcat/10.1.48]
2025-11-15T11:27:09.321-06:00  INFO 55656 --- [componente-b] [           main] o.a.c.c.C.[Tomcat].[localhost].[/]       : Initializing Spring embedded WebApplicationContext
2025-11-15T11:27:09.323-06:00  INFO 55656 --- [componente-b] [           main] w.s.c.ServletWebServerApplicationContext : Root WebApplicationContext: initialization completed in 2373 ms
2025-11-15T11:27:09.580-06:00  INFO 55656 --- [componente-b] [           main] o.hibernate.jpa.internal.util.LogHelper  : HHH000204: Processing PersistenceUnitInfo [name: default]
2025-11-15T11:27:09.660-06:00  INFO 55656 --- [componente-b] [           main] org.hibernate.Version                    : HHH000412: Hibernate ORM core version 6.6.33.Final
2025-11-15T11:27:09.723-06:00  INFO 55656 --- [componente-b] [           main] o.h.c.internal.RegionFactoryInitiator    : HHH000026: Second-level cache disabled
2025-11-15T11:27:10.166-06:00  INFO 55656 --- [componente-b] [           main] o.s.o.j.p.SpringPersistenceUnitInfo      : No LoadTimeWeaver setup: ignoring JPA class transformer
2025-11-15T11:27:10.218-06:00  INFO 55656 --- [componente-b] [           main] com.zaxxer.hikari.HikariDataSource       : HikariPool-1 - Starting...
2025-11-15T11:27:10.564-06:00  INFO 55656 --- [componente-b] [           main] com.zaxxer.hikari.pool.HikariPool        : HikariPool-1 - Added connection org.postgresql.jdbc.PgConnection@74ce7fdf
2025-11-15T11:27:10.564-06:00  INFO 55656 --- [componente-b] [           main] com.zaxxer.hikari.HikariDataSource       : HikariPool-1 - Start completed.
2025-11-15T11:27:10.697-06:00  INFO 55656 --- [componente-b] [           main] org.hibernate.orm.connections.pooling    : HHH10001005: Database info:
        Database JDBC URL [Connecting through datasource 'HikariDataSource (HikariPool-1)']
        Database driver: undefined/unknown
        Database version: 18.0
        Autocommit mode: undefined/unknown
        Isolation level: undefined/unknown
        Minimum pool size: undefined/unknown
        Maximum pool size: undefined/unknown
2025-11-15T11:27:12.044-06:00  INFO 55656 --- [componente-b] [           main] o.h.e.t.j.p.i.JtaPlatformInitiator       : HHH000489: No JTA platform available (set 'hibernate.transaction.jta.platform' to e
nable JTA platform integration)
2025-11-15T11:27:12.203-06:00  INFO 55656 --- [componente-b] [           main] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'
2025-11-15T11:27:12.648-06:00  WARN 55656 --- [componente-b] [           main] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by default. Therefore, database queries may be p
erformed during view rendering. Explicitly configure spring.jpa.open-in-view to disable this warning
2025-11-15T11:27:12.714-06:00  INFO 55656 --- [componente-b] [           main] o.s.v.b.OptionalValidatorFactoryBean     : Failed to set up a Bean Validation provider: jakarta.validation.NoProviderFoundExce
ption: Unable to create a Configuration, because no Jakarta Bean Validation provider could be found. Add a provider like Hibernate Validator (RI) to your classpath.
2025-11-15T11:27:13.298-06:00  INFO 55656 --- [componente-b] [           main] o.s.b.w.embedded.tomcat.TomcatWebServer  : Tomcat started on port 8081 (http) with context path '/'
```

9.5. Frontend



```
Windows PowerShell
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Instale la versión más reciente de PowerShell para obtener nuevas características y mejoras. https://aka.ms/PSWindows

PS C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\dashboard> npm run dev

> dashboard@0.1.0 dev
> next dev

   ▲ Next.js 16.0.2 (Turbopack)
   - Local:        http://localhost:3000
   - Network:      http://192.168.56.1:3000
   - Environments: .env.local

 ✓ Starting...
 ✓ Ready in 1894ms
 ○ Compiling / ...
 GET / 200 in 5.2s (compile: 4.8s, render: 435ms)
```
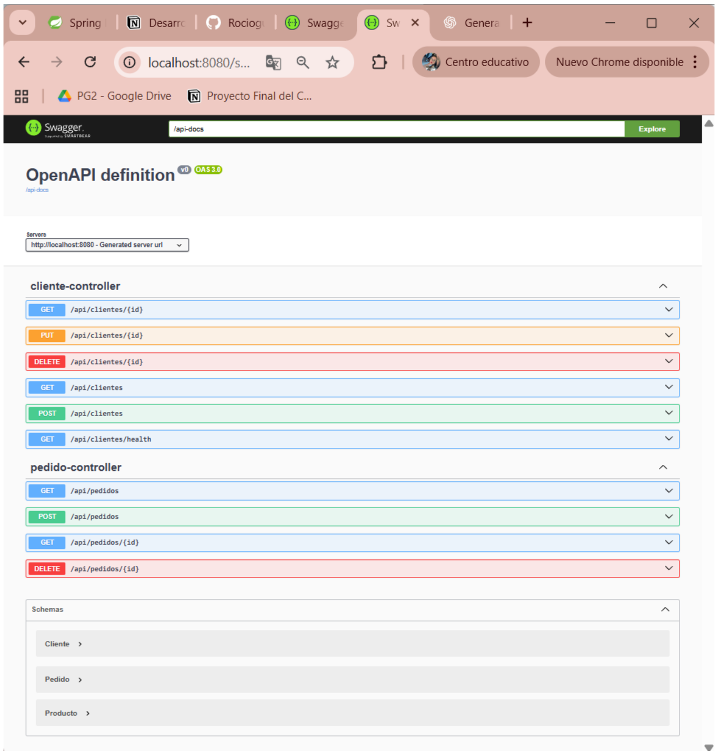

10. Demostración

10.1. SWAGGER A

Endpoints de Cliente y Pedido



/api-docs

OpenAPI definition v0 OAS 3.0

/api-docs

Servers

http://localhost:8080 - Generated server url

cliente-controller

GET /api/clientes/{id}

PUT /api/clientes/{id}

DELETE /api/clientes/{id}

GET /api/clientes

POST /api/clientes

GET /api/clientes/health

pedido-controller

GET /api/pedidos

POST /api/pedidos

GET /api/pedidos/{id}

DELETE /api/pedidos/{id}

Schemas

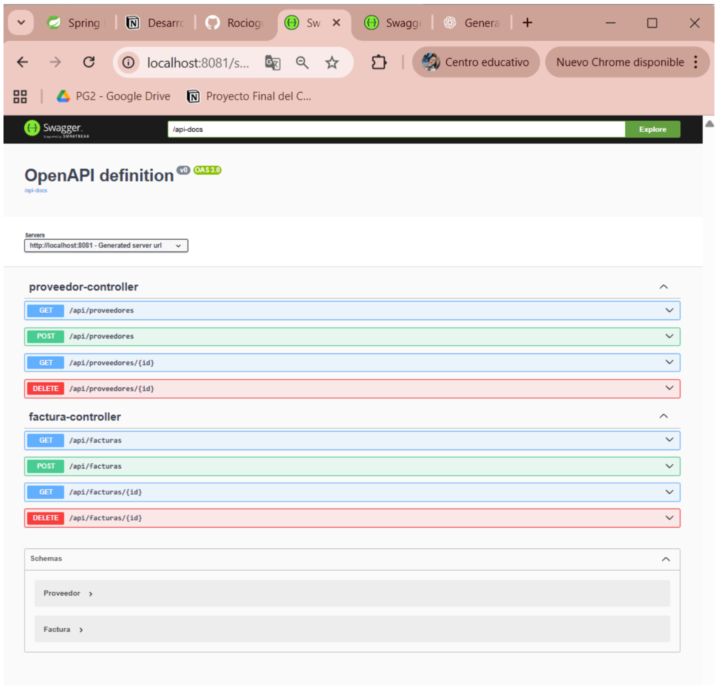
Cliente ›

Pedido ›

Producto ›

10.2. Swagger B

Endpoints de proveedores y facturas.



/api-docs

OpenAPI definition v0 OAS 3.0

/api-docs

Servers

http://localhost:8081 - Generated server url

proveedor-controller

GET /api/proveedores

POST /api/proveedores

GET /api/proveedores/{id}

DELETE /api/proveedores/{id}

factura-controller

GET /api/facturas

POST /api/facturas

GET /api/facturas/{id}

DELETE /api/facturas/{id}

Schemas

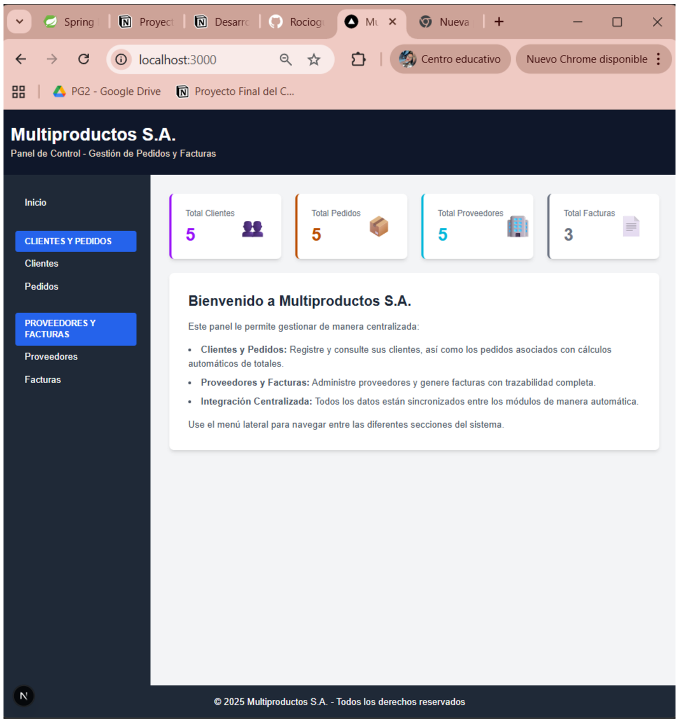
Proveedor ›

Factura ›

11. DASHBOARD

11.1. Home

Página principal con navegación a todas las secciones.



Multiproductos S.A.

Panel de Control - Gestión de Pedidos y Facturas

Total Clientes 5

Total Pedidos 5

Total Proveedores 5

Total Facturas 3

Bienvenido a Multiproductos S.A.

Este panel le permite gestionar de manera centralizada:

- **Clientes y Pedidos:** Registre y consulte sus clientes, así como los pedidos asociados con cálculos automáticos de totales.
- **Proveedores y Facturas:** Administre proveedores y genere facturas con trazabilidad completa.
- **Integración Centralizada:** Todos los datos están sincronizados entre los módulos de manera automática.

Use el menú lateral para navegar entre las diferentes secciones del sistema.

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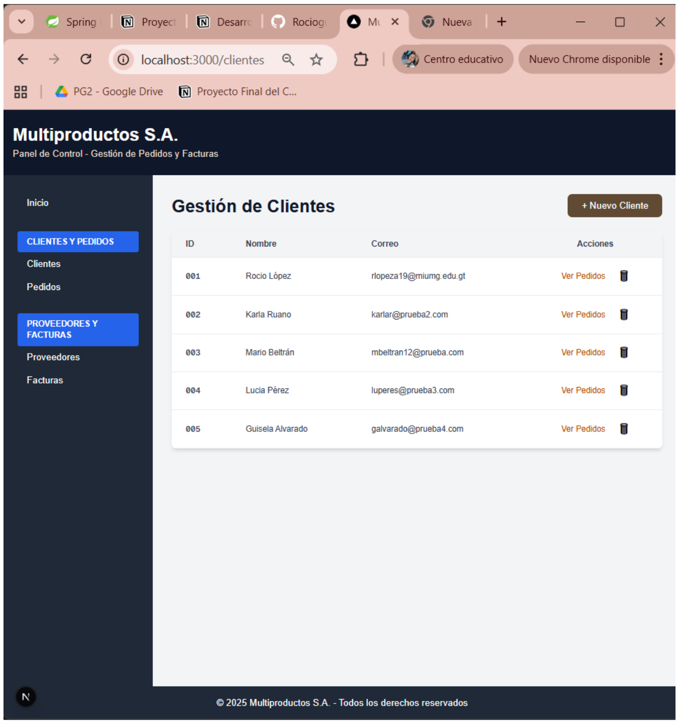
11.2. Gestión de Clientes

Tabla con clientes obtenidos del API (puerto 8080).



Multiproductos S.A.

Panel de Control - Gestión de Pedidos y Facturas

Gestión de Clientes

ID	Nombre	Correo	Acciones
001	Rocio López	rlopeza19@miumg.edu.gt	Ver Pedidos 🗑
002	Karla Ruano	karlar@prueba2.com	Ver Pedidos 🗑
003	Mario Beltrán	mbeltran12@prueba.com	Ver Pedidos 🗑
004	Lucia Pérez	luperes@prueba3.com	Ver Pedidos 🗑
005	Guisela Alvarado	galvarado@prueba4.com	Ver Pedidos 🗑

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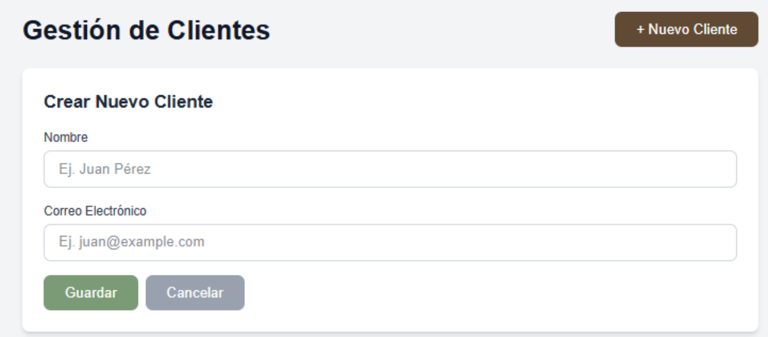


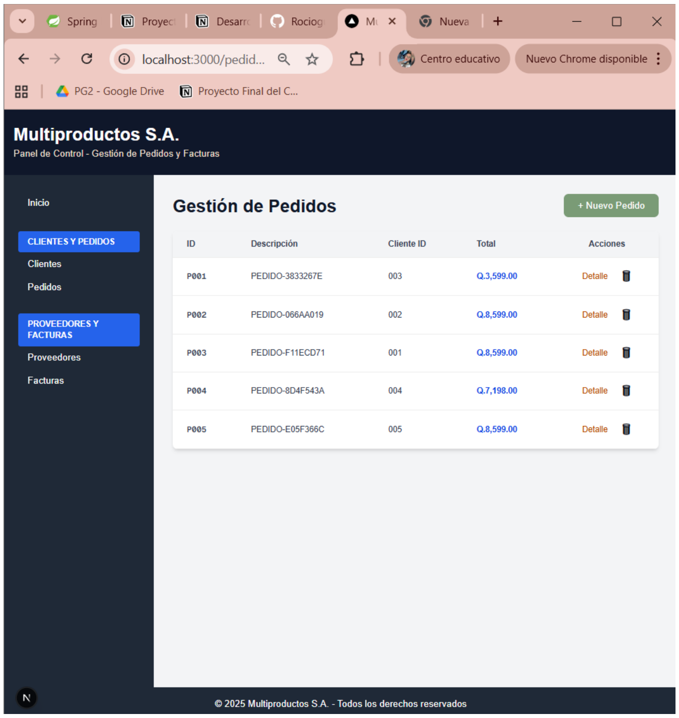
Gestión de Clientes

Crear Nuevo Cliente

Nombre: Ej. Juan Pérez

Correo Electrónico: Ej. juan@example.com

11.3. Gestión de Pedidos



Multiproductos S.A.

Panel de Control - Gestión de Pedidos y Facturas

Gestión de Pedidos

ID	Descripción	Cliente ID	Total	Acciones
P001	PEDIDO-3833267E	003	Q.3,599.00	Detalle 🗑
P002	PEDIDO-066AA019	002	Q.8,599.00	Detalle 🗑
P003	PEDIDO-F11ECD71	001	Q.8,599.00	Detalle 🗑
P004	PEDIDO-8D4F543A	004	Q.7,198.00	Detalle 🗑
P005	PEDIDO-E05F366C	005	Q.8,599.00	Detalle 🗑

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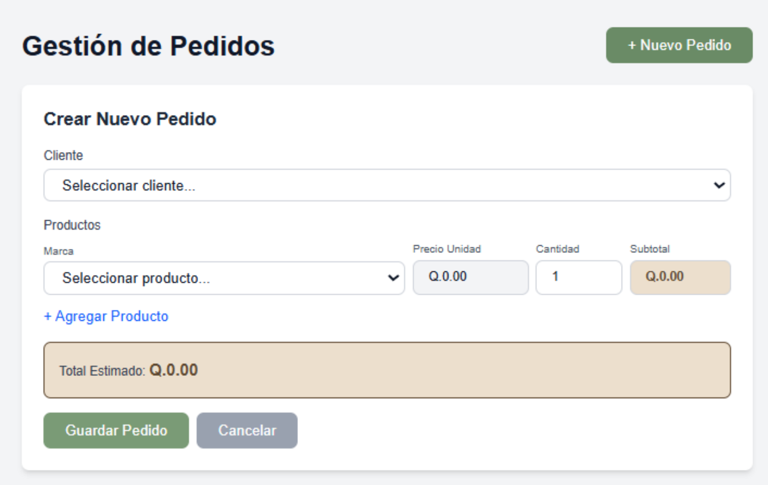


Gestión de Pedidos

Crear Nuevo Pedido

Cliente: Seleccionar cliente...

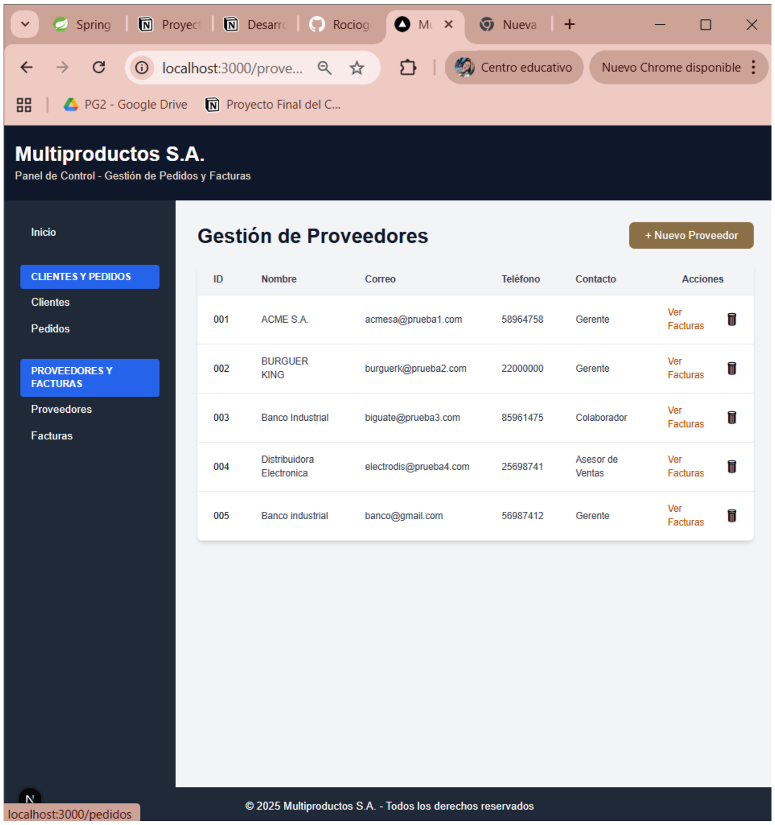
Productos

Marca	Precio Unidad	Cantidad	Subtotal
Seleccionar producto...	Q.0.00	1	Q.0.00

Total Estimado: Q.0.00

11.4. Gestión de Proveedores

Lista de proveedores del API (puerto 8081).



Multiproductos S.A.

Panel de Control - Gestión de Pedidos y Facturas

Gestión de Proveedores

+ Nuevo Proveedor

ID	Nombre	Correo	Teléfono	Contacto	Acciones
001	ACME S.A.	acmesa@prueba1.com	58964758	Gerente	Ver Facturas 🗑
002	BURGUER KING	burguerk@prueba2.com	22000000	Gerente	Ver Facturas 🗑
003	Banco Industrial	biguate@prueba3.com	85961475	Colaborador	Ver Facturas 🗑
004	Distribuidora Electronica	electrodis@prueba4.com	25698741	Asesor de Ventas	Ver Facturas 🗑
005	Banco industrial	banco@gmail.com	56987412	Gerente	Ver Facturas 🗑

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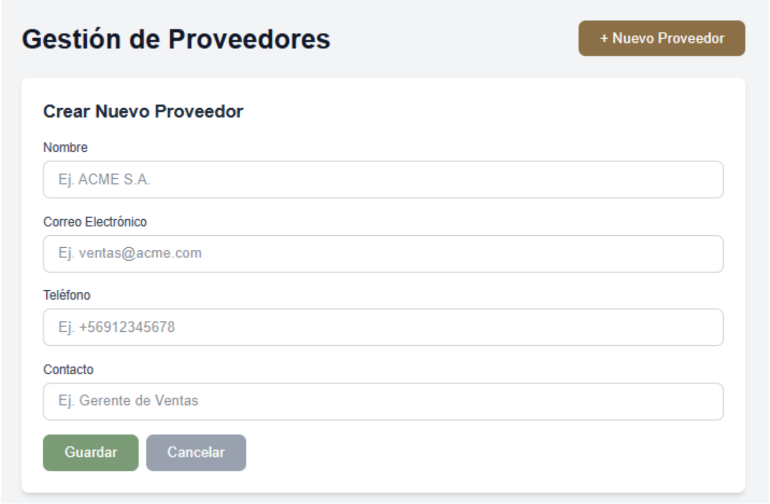


Gestión de Proveedores

+ Nuevo Proveedor

Crear Nuevo Proveedor

Nombre

Ej. ACME S.A.

Correo Electrónico

Ej. ventas@acme.com

Teléfono

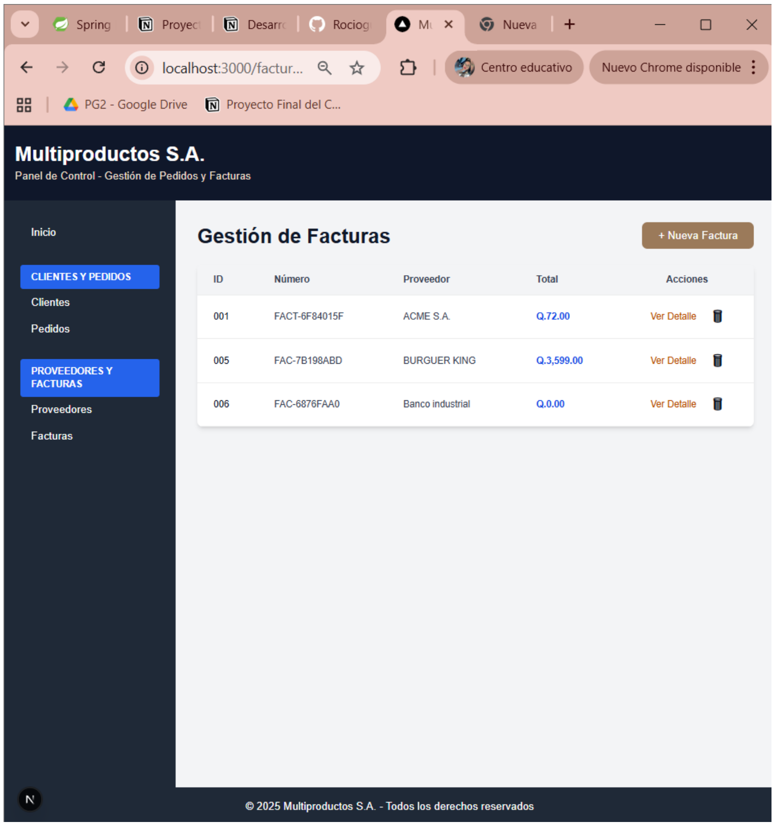
Ej. +56912345678

Contacto

Ej. Gerente de Ventas

Guardar   Cancelar

11.5. Gestión de Facturas



Multiproductos S.A.

Panel de Control - Gestión de Pedidos y Facturas

Gestión de Facturas

ID	Número	Proveedor	Total	Acciones
001	FACT-6F84015F	ACME S.A.	Q.72.00	Ver Detalle 🗑
005	FAC-7B198ABD	BURGUER KING	Q.3,599.00	Ver Detalle 🗑
006	FAC-6876FAA0	Banco industrial	Q.0.00	Ver Detalle 🗑

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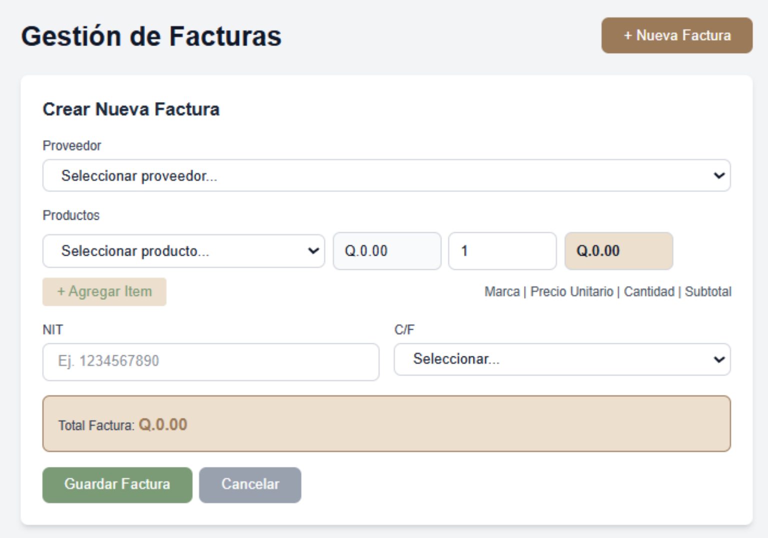


Gestión de Facturas

Crear Nueva Factura

Proveedor: Seleccionar proveedor...

Productos: Seleccionar producto... | Q.0.00 | 1 | Q.0.00

Marca | Precio Unitario | Cantidad | Subtotal

NIT: Ej. 1234567890

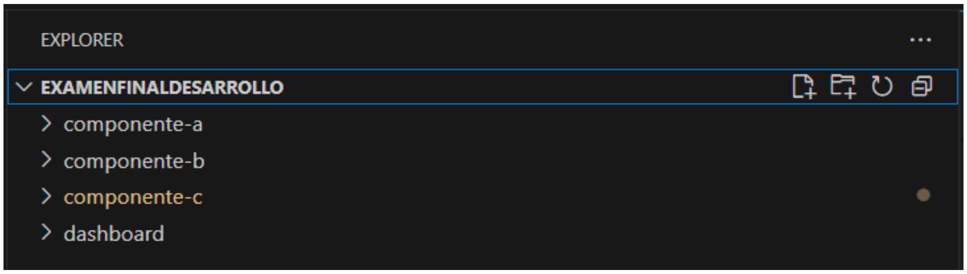
C/F: Seleccionar...

Total Factura: Q.0.00

12. ESTRUCTURA DEL PROYECTO

12.1. Vista General

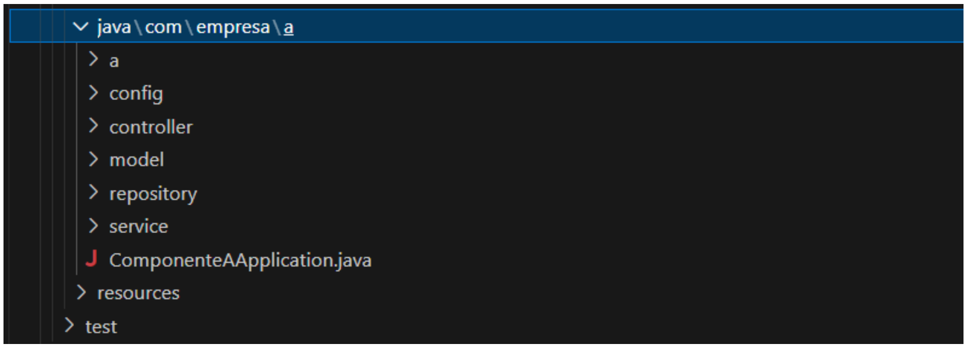
Arquitectura de microservicios con 3 componentes backend y 1 frontend.



```
EXPLORER                                   ...
∨ EXAMENFINALDESARROLLO
  > componente-a
  > componente-b
  > componente-c                           ●
  > dashboard
```

12.2. Estructura Interna

Patrón MVC estándar de Spring Boot. Separación de responsabilidades.



```
    ∨ java\com\empresa\a
      > a
      > config
      > controller
      > model
      > repository
      > service
      J ComponenteAApplication.java
    > resources
  > test
```

CONCLUSIÓN

Las conclusiones del proyecto reflejan el cumplimiento de los objetivos planteados y la correcta implementación de una arquitectura moderna, escalable y orientada a buenas prácticas de desarrollo. A lo largo del proceso se logró diseñar, construir e integrar múltiples componentes que trabajan de manera independiente y coordinada, garantizando robustez, mantenibilidad y eficiencia en el flujo general del sistema. Entre los principales logros alcanzados se destacan:

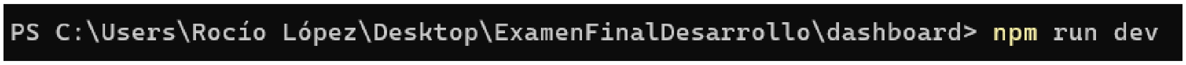
- Arquitectura de microservicios con servicios independientes
- Cada componente con su propia base de datos (MariaDB y PostgreSQL)
- Librería compartida (componente-c) para código reutilizable
- APIs REST documentadas con Swagger
- Frontend moderno con Next.js y TypeScript
- Configuración CORS para integración frontend-backend
- Persistencia con JPA/Hibernate
- Gestión de dependencias con Maven

APRENDIZAJE

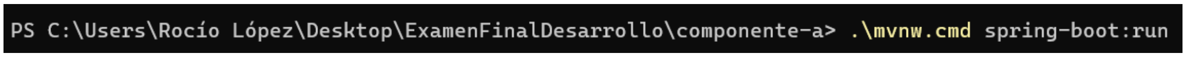
- Diseño e implementación de microservicios
- Spring Boot y Spring Data JPA
- Next.js App Router y React hooks
- Integración de múltiples tecnologías
- Resolución de problemas de configuración

ANEXOS

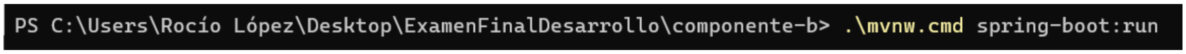
Comandos Principales



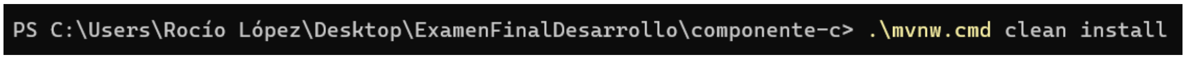
```
PS C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\dashboard> npm run dev
```



```
PS C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-a> .\mvnw.cmd spring-boot:run
```



```
PS C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-b> .\mvnw.cmd spring-boot:run
```



```
PS C:\Users\Rocío López\Desktop\ExamenFinalDesarrollo\componente-c> .\mvnw.cmd clean install
```

URLs del Sistema

Componente A API:	http://localhost:8080/api/
Componente A Swagger:	http://localhost:8080/swagger-ui/index.html
Componente B API:	http://localhost:8081/api/
Componente B Swagger	http://localhost:8081/swagger-ui/index.html
Dashboard	http://localhost:3000