

# Spring Data JDBC Explained

give me the deep and detailed explanation of Spring Data JDBC in spring boot so that i can able to understand it well and do not have any type of doubt in this.

so give me the deep and detailed explanation

Piyush, since you already have **strong JDBC, JPA, and Spring Boot fundamentals**, I'll explain **Spring Data JDBC** from **first principles → internal working → design philosophy → real-world usage → comparison with JPA**, in simple language, step by step.

After this, you should be able to **decide confidently when to use Spring Data JDBC and when not to**.

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## What is Spring Data JDBC (in Spring Boot)?

Spring Data JDBC is a **simple, opinionated data access framework** that helps you interact with **relational databases** using plain SQL concepts, without **ORM complexity**.

👉 Think of Spring Data JDBC as:

**"JDBC made productive + Repository abstraction – ORM magic."**

It is part of the larger **Spring Data** family and works naturally inside **Spring Boot**.

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## ❓ Why was Spring Data JDBC created?

Traditional choices:

Approach	Problem
Raw JDBC	Too much boilerplate
Hibernate / JPA	Complex, heavy, hidden SQL

Approach	Problem
Spring JDBC	Still manual mapping
Template	

So Spring introduced **Spring Data JDBC** to give:

- Simple mapping
  - No proxies
  - No lazy loading
  - No persistence context
  - Full SQL transparency
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## Core Philosophy of Spring Data JDBC

“Your database schema is the truth.”

This is **very different from JPA**.

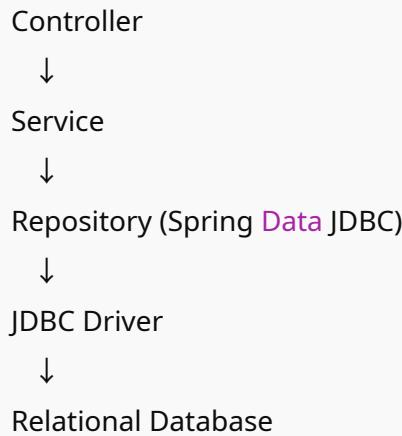
JPA Thinking	JDBC Thinking
Object-centric	Database-centric
Entity lifecycle	Row lifecycle
Lazy loading	Explicit queries
Hidden SQL	Visible SQL

Spring Data JDBC says:

- **One aggregate = one database graph**
  - **No partial loading**
  - **No entity state tracking**
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## Where Spring Data JDBC Fits in Spring Boot Architecture

powershell



No ORM layer in between.

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## 🔑 Key Concepts (Very Important)

### 1 Aggregate Root (MOST IMPORTANT)

Spring Data JDBC works with **Aggregates**, not entities.

#### What is an Aggregate?

An **Aggregate** is a group of objects that are saved **together**.

Example:

```
java

Order
└── OrderItem
└── OrderItem
```

Here:

- `Order` = Aggregate Root
- `OrderItem` = Part of aggregate

📌 You **never** save `OrderItem` separately.

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### 2 Entity Mapping (Very Simple)

```
java
```

```
@Table("users")
public class User {

    @Id
    private Long id;

    private String name;
    private String email;
}
```

### Important annotations:

- `@Table` → table name
- `@Id` → primary key

✗ No:

- `@Entity`
- `@OneToMany`
- `@ManyToOne`
- `@Lazy`

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## 3 Repository Layer (Magic but Simple)

```
java

public interface UserRepository
    extends CrudRepository<User, Long> {
}
```

Spring automatically provides:

- `save()`
- `findById()`
- `findAll()`
- `deleteById()`

This comes from Spring Data JDBC repository abstraction.

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## 🛠 How Save Works Internally

When you call:

```
java  
  
userRepository.save(user);
```

### **Internally:**

1. Checks if `id == null`
2. If yes → `INSERT`
3. If no → `UPDATE`
4. Executes SQL directly using JDBC
5. No caching
6. No dirty checking

📌 Every call hits the database.

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## Relationships in Spring Data JDBC

### No ORM Relationships

- No `@OneToMany`
- No `@ManyToOne`

### Only Aggregate Relationships

```
java  
  
@Table("orders")  
class Order {  
  
    @Id  
    Long id;  
  
    List<OrderItem> items;  
}
```

```
java  
  
@Table("order_items")  
class OrderItem {
```

```
String product;  
int quantity;  
}
```

Spring automatically:

- Inserts order
- Inserts all items
- Uses **foreign key internally**

But:

- ✗ No joins
  - ✗ No lazy loading
- 

## Custom Queries

You write SQL explicitly.

```
java  
  
@Query("SELECT * FROM users WHERE email = :email")  
User findByEmail(String email);
```

 You control the SQL.

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## Transactions (Works Same as You Know)

```
java  
  
@Transactional  
public void createUser(User user) {  
    repository.save(user);  
}
```

Spring uses **Spring Transaction Management** internally.

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## Configuration in Spring Boot

Add dependency:

xml

```
<dependency>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-data-jdbc</artifactId>
</dependency>
```

Configure datasource (same as JDBC/JPA):

properties

```
spring.datasource.url=jdbc:mysql://localhost:3306/testdb
spring.datasource.username=root
spring.datasource.password=pass
```

## Example Flow (Very Important)

### Save User

java

```
User user = new User(null, "Piyush", "piyush@mail.com");
repository.save(user);
```

### Generated SQL:

sql

```
INSERT INTO users (name, email) VALUES (?, ?)
```

### Fetch User

java

```
repository.findById(1L);
```

sql

```
SELECT * FROM users WHERE id = ?
```

# Spring Data JDBC vs JPA (VERY CLEAR COMPARISON)

Feature	Spring Data JDBC	JPA / Hibernate
ORM	 No	 Yes
Lazy loading		
SQL control	 Full	 Hidden
Performance predictability	 High	 Complex
Learning curve	 Easy	 Steep
Complex relationships		

## When Should YOU Use Spring Data JDBC?

### Use it when:

- You want **simple CRUD**
- You want **full SQL control**
- You want **predictable performance**
- You dislike Hibernate magic

### Avoid when:

- Complex joins
- Lazy loading
- Bidirectional relationships
- Large enterprise ORM models

## Mental Model (Remember This)

| Spring Data JDBC = JDBC + Repository + Aggregate Rules

No magic. No guessing. No hidden behavior.

## 🏁 Final Summary

- ✓ Spring Data JDBC is **not a replacement for JPA**
  - ✓ It is a **simpler, cleaner alternative**
  - ✓ It forces **good database design**
  - ✓ It gives **clarity and control**
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If you want next:

- 👉 **Spring Data JDBC vs Spring JDBC Template (deep dive)**
- 👉 **Real-world project structure using Spring Data JDBC**
- 👉 **Migrating from JPA to JDBC**

Just tell me 👍