# **Difference Between JPA, Hibernate, and Spring Data JPA**

**1. Java Persistence API (JPA)**

* **Definition**: JPA is a **Java specification** (JSR 338) that provides a standard for ORM (Object Relational Mapping) in Java.
* **Role**: Acts as an **interface or contract** for persisting Java objects to a relational database.
* **Key Point**: JPA **does not provide an implementation**—it just defines **how** ORM should work.
* **Common Implementations**: Hibernate, EclipseLink, OpenJPA, etc.

**2. Hibernate**

* **Definition**: Hibernate is a **popular ORM framework** that provides a **concrete implementation of JPA**.
* **Role**: Maps Java classes to database tables, handles CRUD, caching, lazy loading, etc.
* **Key Point**: Hibernate can work **with or without JPA**, but is often used as the **JPA provider**.

**3. Spring Data JPA**

* **Definition**: Spring Data JPA is a **Spring framework module** that provides a **higher-level abstraction** over JPA.
* **Role**: It **eliminates boilerplate code** by auto-generating repository methods like save(), findById(), delete(), etc.
* **Key Point**: Spring Data JPA does **not implement JPA** itself; it works **on top of JPA providers** like Hibernate.

Code Comparison🡪

**🔸 Hibernate Example:**

**public Integer addEmployee(Employee employee){**

**Session session = factory.openSession();**

**Transaction tx = null;**

**Integer employeeID = null;**

**try {**

**tx = session.beginTransaction();**

**employeeID = (Integer) session.save(employee);**

**tx.commit();**

**} catch (HibernateException e) {**

**if (tx != null) tx.rollback();**

**e.printStackTrace();**

**} finally {**

**session.close();**

**}**

**return employeeID;**

**}**

**🔹 Spring Data JPA Example:**

**Repository Interface:**

**public interface EmployeeRepository extends JpaRepository<Employee, Integer> {**

**}**

**Service Class:**

**@Autowired**

**private EmployeeRepository employeeRepository**

**@Transactional**

**public void addEmployee(Employee employee) {**

**employeeRepository.save(employee);}**

**🡺 We don't write transaction or save logic yourself.**

**🡺 JpaRepository provides built-in methods.**

**🡺 Spring handles dependency injection, transactions, and data persistence automatically.**