**Difference between JPA, Hibernate and Spring Data JPA**

In java applications, persistence refers to saving and retrieving data from a database. To simply persistence,

* JPA (Java Persistence API) – Specification for ORM.
* Hibernate – Implementation of JPA + extra features.
* Spring Data JPA – A spring module that simplifies JPA – based data access

**JPA (Java Persistence API)**

* JPA is a specification provided by java.
* It defines how java objects are mapped to relational databases.
* JPA doesn’t provide implementation – it’s just a set of interfaces and annotations.

Key Features:

* Defines ORM mappings with annotations like @Entity, @Table.
* Provides APIs like EntityManager for CRUD operations.
* Allows queries using JPQL.

Example for JPA:

|  |
| --- |
| @Entity  public class Book {  @Id  private Long id;  private String title;  } |

**Hibernate**

* Hibernate is a JPA implementation.
* It provides the actual code to perform persistence operations.
* Adds extra features not defined by JPA like caching, dirty checking, and HQL.

Key Features of Hibernate:

* Implements all JPA interfaces.
* Supports advanced ORM features – lazy loading, first / second level caching.
* Provides both JPQL and its own HQL.

Example for Hibernate:

|  |
| --- |
| Session session = sessionFactory.openSession();  session.beginTransaction();  session.save(book);  session.getTransaction().commit();  session.close(); |

**Spring Data JPA**

* Spring Data JPA is a Spring Framework module.
* It simplifies JPA by removing boilerplate DAO code.
* Interfaces are just defined – Spring Data JPA creates implementations automatically.

Key Features:

* Provides pre-built Repository interfaces like JpaRepository.
* Allows creating custom queries by method names.
* Integrates tightly with Spring Boot for configuration-less setup.

Example i.e. Repository

|  |
| --- |
| public interface BookRepository extends JpaRepository<Book, Long> {  List<Book> findByTitle (String title);  } |

Comparison: JPA vs Hibernate vs Spring Data JPA

|  |  |  |  |
| --- | --- | --- | --- |
| **Feature** | **JPA** | **Hibernate** | **Spring Data JPA** |
| **Type** | Specification | Implementation | Spring Module |
| **Provided By** | Oracle | Red Hat | Spring Framework |
| **Boilerplate Code** | Needs manual DAO code | Less, but still some DAO | Minimal |
| **Query Language** | JPQL | JPQL + HQL | Derived queries + JPQL + native |
| **Caching** | Not included | First & Second Level Caching | Uses Hibernate caching |
| **Implementation** | No | Yes | Uses Hibernate/JPA internally |

**Working of Together**:

Spring Data JPA

JPA

Hibernate

Database