**MODULE 6-Spring Data JPA with Spring Boot, Hibernate**

# Difference Between JPA, Hibernate, and Spring Data JPA

## 1. Java Persistence API (JPA)

• JPA is a specification (JSR 338) defined by Java for object-relational mapping (ORM).  
• It provides a standard way to map Java objects to relational database tables.  
• JPA does not provide an implementation; it only defines interfaces and annotations.  
• Example implementations include Hibernate, EclipseLink, and OpenJPA.

More Info: https://www.javaworld.com/article/3379043/what-is-jpa-introduction-to-the-java-persistence-api.html

## 2. Hibernate

• Hibernate is a popular ORM framework in Java and also a JPA provider.  
• It implements the JPA specification and provides additional features like lazy loading, caching, and HQL.  
• Hibernate can be used with or without JPA.  
• Example usage: Session.save(entity), Session.get(), etc.

## 3. Spring Data JPA

• Spring Data JPA is a part of the Spring ecosystem that provides a higher-level abstraction over JPA.  
• It helps reduce boilerplate code when implementing repositories and simplifies data access logic.  
• Key features include auto-generated queries, integration with Spring Boot, and default use of Hibernate.  
• Example usage:  
 public interface BookRepository extends JpaRepository<Book, Long> {  
 List<Book> findByAuthor(String author);  
 }

Reference: https://dzone.com/articles/what-is-the-difference-between-hibernate-and-sprin-1

## Summary Table

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| --- | --- | --- | --- |
| Feature | JPA | Hibernate | Spring Data JPA |
| Type | Specification (API) | Implementation (ORM Framework) | Abstraction (Spring-based helper over JPA) |
| Provided By | Java EE / Jakarta EE | Hibernate.org | Spring Framework |
| Boilerplate Reduction | No | Minimal | Yes |
| Configuration | Manual (annotations/XML) | XML/Annotation-based | Convention-over-configuration |
| Query Language | JPQL | HQL (extends JPQL) | Method name queries, JPQL, native queries |
| Integration | With any JPA implementation | Implements JPA or standalone | Uses Hibernate as JPA provider |

## Conclusion

• JPA is a standard (like an interface).  
• Hibernate is a tool that implements JPA (like a concrete class).  
• Spring Data JPA is a helper framework built on top of JPA and Hibernate to automate and simplify data persistence.