**Hands-on 4: Understanding the Difference between JPA, Hibernate, and Spring Data JPA**

**Java Persistence API (JPA)**

JPA is a Java specification (JSR 338) that defines how Java objects should be persisted to relational databases. It provides a standard set of annotations and interfaces, but does not contain any implementation itself. It relies on external libraries like Hibernate for actual functionality.

**Example Syntax:**

@Entity

@Table(name = "employee")

public class Employee {

@Id

@GeneratedValue(strategy = GenerationType.IDENTITY)

private int id;

@Column(name = "name")

private String name;

}

**Hibernate**

Hibernate is an ORM (Object-Relational Mapping) tool that provides a concrete implementation of the JPA specification. It maps Java classes to database tables and handles CRUD operations, caching, and lazy loading. It requires manual session and transaction management.

**Example Syntax:**

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**

Spring Data JPA is a Spring-based abstraction over JPA. It works with JPA implementations like Hibernate but simplifies development by eliminating boilerplate code. It uses Spring’s dependency injection and provides ready-to-use repository interfaces.

**Example Syntax:**

EmployeeRepository.java

public interface EmployeeRepository extends JpaRepository<Employee, Integer> {

}

EmployeeService.java

@Autowired

private EmployeeRepository employeeRepository;

@Transactional

public void addEmployee(Employee employee) {

employeeRepository.save(employee);

}

**Summary**

* JPA is a specification, not a tool.
* Hibernate is an implementation of JPA that requires more manual coding.
* Spring Data JPA builds on JPA and Hibernate, offering a cleaner, declarative approach.