**Introduction to HQL and JPQL:**

**Overview:**

In the context of Java-based enterprise applications, object-relational mapping (ORM) frameworks like Hibernate and JPA (Java Persistence API) play a critical role in abstracting the database layer. To perform queries in an object-oriented manner, Hibernate provides **HQL (Hibernate Query Language)** and JPA provides **JPQL (Java Persistence Query Language)**.

These languages are designed to work with **entity objects** rather than database tables, allowing developers to interact with the database using the **domain model** of their application.

**What is HQL:**

**Hibernate Query Language (HQL)** is an object-oriented query language provided by the Hibernate ORM framework. It is similar in syntax to SQL but is focused on the object model rather than the relational database model.

* Queries are written against **Java objects** and their properties, not database tables or columns.
* HQL supports both **standard SQL-like queries** and **Hibernate-specific features**.
* It is fully integrated with Hibernate’s session and transaction management.

**What is JPQL:**

**Java Persistence Query Language (JPQL)** is the query language defined by the **JPA specification**. It is used to write queries against **entities** managed by a JPA provider (e.g., Hibernate, EclipseLink).

* Like HQL, it operates on the object model.
* JPQL provides a standardized way of querying across various JPA implementations.
* It is intended to be **database-agnostic**, increasing portability of queries.

**Similarities Between HQL and JPQL**

* Both HQL and JPQL are **object-oriented** query languages.
* Syntax is very similar to SQL, making it easier for developers with SQL knowledge to adopt.
* Both support **SELECT**, **UPDATE**, and **DELETE** operations.
* Queries return **Java objects** or object collections instead of raw database rows.
* Both support **joins**, **aggregations**, **grouping**, **subqueries**, **named queries**, and **parameter binding**.

**HQL and JPQL Query Examples:**

**Example of a SELECT Query:**

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String hql = "FROM Employee e WHERE e.salary > :minSalary";

Query query = session.createQuery(hql);

query.setParameter("minSalary", 50000);

List<Employee> results = query.list();

**Example of an UPDATE Query:**

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String jpql = "UPDATE Employee e SET e.salary = e.salary + 5000 WHERE e.department.name = 'IT'";

Query query = entityManager.createQuery(jpql);

query.executeUpdate();

**Example of a DELETE Query:**

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String jpql = "DELETE FROM Employee e WHERE e.id = :id";

Query query = entityManager.createQuery(jpql);

query.setParameter("id", 101);

query.executeUpdate();

**When to Use HQL vs. JPQL:**

* Use **HQL** when working specifically with **Hibernate** and when you require **Hibernate-specific features** like INSERT statements or custom data types.
* Use **JPQL** when writing code that must remain **portable** across different JPA implementations.

**Conclusion:**

HQL and JPQL empower developers to interact with the database in a way that aligns with the Java object model, improving **readability**, **maintainability**, and **portability**. Understanding the nuances of both is essential for building robust enterprise applications with ORM frameworks.