1. **Introduction to Hibernate Architectur**

**Hibernate Architecture:**

**• Theory:**

**1.Explanation of the Hibernate architecture components: ♣ SessionFactory: Configuration of Hibernate and creation of sessions. ♣ Session: The main interface between the Java application and the database. ♣ Transaction: Handling database transactions in Hibernate. ♣ Query: Writing HQL (Hibernate Query Language) queries to interact with the database. ♣ Criteria: Criteria API for building dynamic queries:-**

**1. SessionFactory 🏭**

🔹 **Definition:**

* A **factory** for creating Session objects.
* Configures Hibernate and manages database connections.
* Created **only once** and is **thread-safe**.

🔹 **Usage:**

* Loads Hibernate configuration from hibernate.cfg.xml or annotations.
* Provides Session objects for database interactions.

**2. Session 📦**

🔹 **Definition:**

* The **main interface** between the Java application and the database.
* Provides methods to **save, update, delete, and fetch** records.
* Not **thread-safe** and should be used **per transaction**.

🔹 **Usage:**

* Opens a connection with the database.
* Performs CRUD (Create, Read, Update, Delete) operations.

**3. Transaction 🔄**

🔹 **Definition:**

* Manages **database transactions** in Hibernate.
* Ensures **commit** or **rollback** based on operation success or failure.

🔹 **Usage:**

* Helps maintain **ACID properties** in the database.

**4. Query 🎯 (HQL - Hibernate Query Language)**

🔹 **Definition:**

* Used to write database queries using **HQL (object-based SQL)**.
* Works with **Java objects** instead of tables.
* Database-independent queries.

🔹 **Usage:**

* Retrieves, updates, or deletes data using **HQL**.

**5. Criteria API 📊 (Dynamic Queries)**

🔹 **Definition:**

* Used for **dynamic and flexible** query building.
* No need to write HQL or SQL manually.

🔹 **Usage:**

* Useful when queries depend on **user inputs** (e.g., filtering by name, salary, etc.).

**2.How Hibernate works internally from loading configuration files to executing queries:-** Hibernate follows multiple steps, from loading configuration to executing queries.

1. Load Hibernate Configuration

2. Build SessionFactory

3. Open a Session

4. Begin Transaction

5. Execute Query (HQL, Criteria, Native SQL)

6. Commit or Rollback Transaction

7. Close Session and SessionFactory