Day3: Basic CRUD operation using JPA with Hibernate:

Note: When we call the **createEntityManagerFactory(-)** method on the **Persistence** class by supplying the persistence-unit name, we will get the **EntityManagerFactory** object.

- This method loads the **"persistence.xml"** file into the memory
- **EntityManagerFactory** object should be only one per application.

This **EntityManagerFactory** object contains:

Connection pool (readily available some JDBC connection objects)

Some meta information

This EntityManagerFactory is a heavy-weight object, by using this EntityManagerFactory class only we create the **EntityManager** object.

EntityManagerFactory is a heavy weight object, it should be one per application.

```
EntityManager em= emf.createEntityManager();
```

Note:- Inside every DAO method(for every use case) we need to get the EntityManager object after performing the database operation for that use case we should close the EntityManager object.

Inserting a Record:

In order to perform any **DML (insert update delete)** the method calls should be in a transactional area.

em.getTransaction() method returns the "**javax.persistence.EntityTransaction** " object.

This **EntityTransaction** object is a singleton object, i.e. per EntityManager object, only one EntityTransaction object is created.

To store the object we need to call **persist(-)** method on the **EntityManager** object.

Example:

```
package com.masai; import javax.persistence.EntityManager; import
javax.persistence.EntityManagerFactory; import javax.persistence.Persistence; public
class Demo { public static void main(String[] args) { EntityManagerFactory emf=
Persistence.createEntityManagerFactory("studentUnit"); EntityManager em=
emf.createEntityManager(); Student student= new Student(30, "Ratan", 500); //
EntityTransaction et= em.getTransaction(); // // et.begin(); // // em.persist(student);
// // et.commit(); em.getTransaction().begin(); em.persist(student);
em.getTransaction().commit(); System.out.println("done..."); em.close(); } }
```

Delete Operation:

```
public class Main { public static void main(String[] args) { EntityManagerFactory
emf=Persistence.createEntityManagerFactory("studentUnit"); EntityManager em=
emf.createEntityManager(); Scanner sc=new Scanner(System.in); System.out.println("Enter
roll to delete "); int roll=sc.nextInt(); Student student= em.find(Student.class, roll);
if(student != null){ em.getTransaction().begin(); em.remove(student);
em.getTransaction().commit(); System.out.println("Student removed...."); }else
System.out.println("Student not found..."); em.close(); System.out.println("done"); } }
```

Update Operation:

Update the marks:

```
public class Main { public static void main(String[] args) { EntityManagerFactory
emf=Persistence.createEntityManagerFactory("studentUnit"); EntityManager em=
emf.createEntityManager(); Scanner sc=new Scanner(System.in); System.out.println("Enter
roll to give grace marks "); int roll=sc.nextInt(); Student
student=em.find(Student.class, roll); //if it returns the obj then the obj will be in
p.state if(student == null){ System.out.println("Student does not exist.."); } else {
System.out.println("Enter the grace marks"); int marks=sc.nextInt();
em.getTransaction().begin(); student.setMarks(student.getMarks()+marks);
em.getTransaction().commit(); System.out.println("Marks is graced..."); } em.close();
System.out.println("done"); } }
```

In the above application, we didn't call any update method, we just change the state of the persistence/entity object inside the transactional area, at the end of the transaction, the ORM engine will generate the update SQL.

- This is known as the ORM s/w maintaining synchronization between Entity object and the database table records.
- We have a method called merge() inside the EntityManager obj to update a record also.

Life-cycle of persistence/entity object:-

An Entity object has the 3 life-cycle stages:

1. New state/transient stage
2. Persistence state/managed stage
3. Detached stage

1. New state/transient stage:

If we create an object of persistence class and this class is not attached to the EntityManager object then this stage is known as the new state/transient stage.

example:

Student student=new Student(10,"Ram",780);

2. Persistence stage:

If a persistence class object or Entity object is associated with the EntityManager object, then this object will be in a **persistence stage**.

example:

When we call the **persist(-)** method by supplying the Student entity object then at that time student object will be in a persistence state

OR

When we call the **find()** method and this method returns the Student object, then that object will also be in a persistence stage.

Note:- when an entity class object is in the persistence stage, It will be in-sync with the database table i.e. any change made on that object inside the transactional area will reflect table automatically.

ex:-

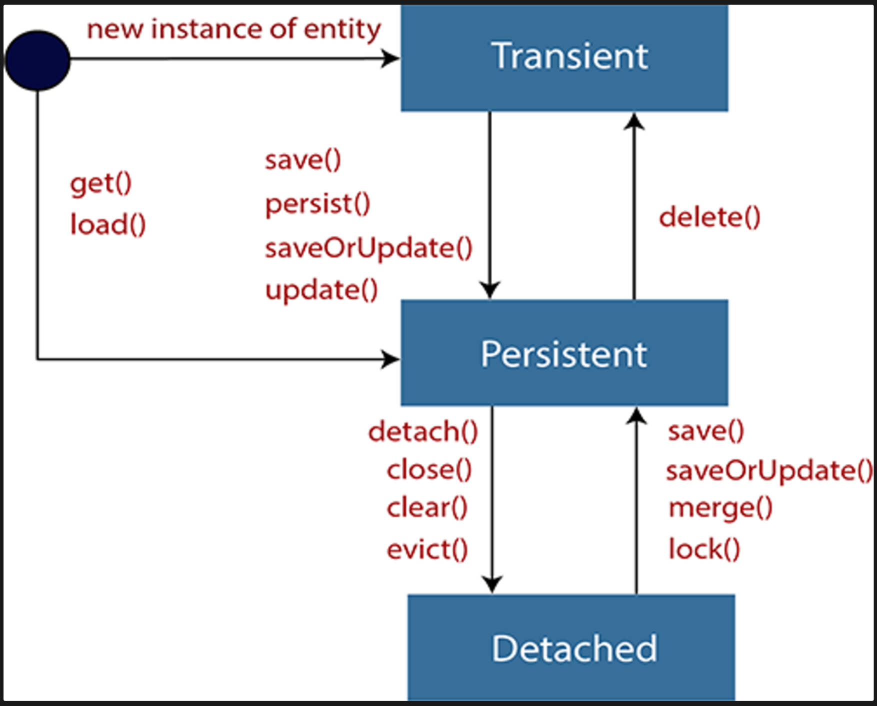
```
Student s=new Student(150,"Manoj",850); // here student obj is in transient state. em.ge
tTransaction().begin(); em.persist(s); // here it is in the persistence state s.setMarks
(900); em.getTransaction().commit();
```

3. Detached stage:

When we call the **close()** method or call the **clear()** method on the EntityManager object, then all the associated entity objects will be in a detached state.

In this stage, the entity objects will not be **in-sync** with the table.

Note:- we have a merge() method in the EntityManager object, when we call this method by supplying any detached object then that detached object will bring back into the persistence state.



Example:

Heading 2

```
//Main.java:- public class Main { public static void main(String[] args) { EntityManager
Factory emf=Persistence.createEntityManagerFactory("studentUnit"); EntityManager em= em
f.createEntityManager(); Student s= em.find(Student.class, 20); //persistence state em.c
lear(); //detached state em.getTransaction().begin(); s.setMarks(500); //em.persist
(s);// it will throw duplicate ID related exception em.merge(s); //persistence state em.
getTransaction().commit(); em.close(); System.out.println("done"); } }
```

Note:- To see the ORM tool(Hibernate) generated SQL queries on the console add the following property inside the persistence.xml:

```
<property name="hibernate.show_sql" value="true"/>
```

To create or update the table according to the entity class mapping information:

```
<property name="hibernate.hbm2ddl.auto" value="create"/>
```

create: Drop the existing table then create a fresh new table and insert the record.

update: If the table is not there then create a new table, and if the table is already there, it will perform the insert operation only in the existing table.

Some of the annotations of JPA:

@Entity: to make a Java bean class as an entity class, i.e. to map with a table

@Id: To make a field as the ID field (to map with Primary Key of a table)

@Table(name="mystudents"): If the table name and the class names are different

@Column(name="sname"): If the column name of the table and corresponding variable of the Entity class is different.

@Transient: It will ignore the filed value while persisting the Entity object.

@Temporal: To save the Date type of value inside the Database (LocalDate, LocalDateTime)

@Enumerated: We can use the *@Enumerated* annotation to specify whether the *enum* should be persisted by name or by ordinal (default):

Generators in JPA:

Generators are used to generate the ID filed value automatically.

Example:

```
@Id @GeneratedValue(strategy=GenerationType.AUTO) private int roll;
```

Here roll will be generated automatically for each row.

Note: If we use this **@GeneratedValue** annotation then we should not give the roll explicitly while inserting a record.

So we should create the entity class object by using the zero-argument constructor and set each value by calling the setter method. or we can use an overloaded constructor which ignores the Id field.

For the auto-generated strategy we can use one of the following 3 options:

AUTO: internally underlying ORM s/w creates a table called "**hibernate_sequence**" to maintain the Id value.

IDENTITY: It is used for the auto_increatement feature of the database to auto-generate the id value

SEQUENCE: It is used the **sequence** feature of the database to auto-generate the Id value.

TABLE: Hibernate uses a database table to simulate a sequence.

DAO pattern example with JPA:

```
EMUtil.java:- ---------------- package com.masai.utility; public class EMUtil { private
static EntityManagerFactory emf; static{
emf=Persistence.createEntityManagerFactory("account-unit"); } public static
EntityManager provideEntityManager(){ //EntityManager em= emf.createEntityManager();
//return em; return emf.createEntityManager(); } }
```

```
Account.java:- (Entity class) ---------------- package com.masai.model; @Entity public class Account { @Id @GeneratedValue(strategy = GenerationType.AUTO) private int accno; private String name; private int balance; public Account() { // TODO Auto-generated constructor stub } public int getAccno() { return accno; } public void setAccno(int accno) { this.accno = accno; } public String getName() { return name; } public void setName(String name) { this.name = name; } public int getBalance() { return balance; } public void setBalance(int balance) { this.balance = balance; } public Account(int accno, String name, int balance) { super(); this.accno = accno; this.name = name; this.balance = balance; } @Override public String toString() { return "Account [accno=" + accno + ", name=" + name + ", balance=" + balance + "]"; } }
```

```
AccountDao.java:-(interface) -------------------- package com.masai.dao; public interface AccountDao { public boolean createAccount(Account account); public boolean deleteAccount(int accno); public boolean updateAccount(Account account); public Account findAccount(int accno); }
```

```
AccountDaoImpl.java:- --------------------------- package com.masai.dao; public class AccountDaoImpl implements AccountDao{ @Override public boolean createAccount(Account account) { boolean flag= false; EntityManager em= EMUtil.provideEntityManager(); em.getTransaction().begin(); em.persist(account); flag=true; em.getTransaction().commit(); em.close(); return flag; } @Override public boolean deleteAccount(int accno) { boolean flag=false; EntityManager em= EMUtil.provideEntityManager(); Account acc=em.find(Account.class, accno); if(acc != null){ em.getTransaction().begin(); em.remove(acc); flag=true; em.getTransaction().commit(); } em.close(); return flag; } @Override public boolean updateAccount(Account account) { boolean flag=false; EntityManager em= EMUtil.provideEntityManager(); em.getTransaction().begin(); em.merge(account); flag=true; em.getTransaction().commit(); em.close(); return flag; } @Override public Account findAccount(int accno) { /*Account account=null; EntityManager em=EMUtil.provideEntityManager(); account = em.find(Account.class, accno); return account;*/ return EMUtil.provideEntityManager().find(Account.class, accno); } }
```

persistence.xml:

```
<?xml version="1.0" encoding="UTF-8"?> <persistence
xmlns="http://java.sun.com/xml/ns/persistence"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://java.sun.com/xml/ns/persistence
http://java.sun.com/xml/ns/persistence/persistence_2_0.xsd" version="2.0"> <persistence-
unit name="account-unit" > <properties> <property
name="hibernate.connection.driver_class" value="com.mysql.cj.jdbc.Driver"/> <property
name="hibernate.connection.username" value="root"/> <property
name="hibernate.connection.password" value="root"/> <property
name="hibernate.connection.url" value="jdbc:mysql://localhost:3306/ratandb"/> <property
name="hibernate.show_sql" value="true"/> <property name="hibernate.hbm2ddl.auto"
value="update"/> </properties> </persistence-unit> </persistence>
```

```
DepositUseCase.java:- ---------------------------- package com.masai.usecases; public
class DepositUseCase { public static void main(String[] args) { AccountDao dao=new
AccountDaoImpl(); /*Account acc1=new Account(); acc1.setName("Ramesh");
acc1.setBalance(880); boolean f= dao.createAccount(acc1); if(f)
System.out.println("Account created.."); else System.out.println("Not created...");*/
Scanner sc=new Scanner(System.in); System.out.println("Enter Account number"); int
ano=sc.nextInt(); Account acc= dao.findAccount(ano); if(acc == null)
System.out.println("Account does not exist.."); else{ System.out.println("Enter the
Amount to Deposit"); int amt=sc.nextInt(); acc.setBalance(acc.getBalance()+amt); boolean
f =dao.updateAccount(acc); if(f) System.out.println("Deposited Sucessfully..."); else
System.out.println("Technical Error ....."); } } }
```

```
WithdrawUseCase.java:- ----------------------------- package com.masai.usecase; public
class WithdrawUseCase { public static void main(String[] args) { AccountDao dao=new
AccountDaoImpl(); Scanner sc=new Scanner(System.in); System.out.println("Enter Account
number"); int ano=sc.nextInt(); Account acc= dao.findAccount(ano); if(acc == null)
System.out.println("Account does not exist.."); else{ System.out.println("Enter the
withdrawing amount"); int amt=sc.nextInt(); if(amt <= acc.getBalance()){
acc.setBalance(acc.getBalance()-amt); boolean f=dao.updateAccount(acc); if(f)
System.out.println("please collect the cash..."); else System.out.println("Technical
Error..."); }else System.out.println("Insufficient Amount.."); } } }
```