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Employee program:

Employee pom.xml:

```
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 https://maven.apache.org/xsd/maven-4.0.0.xsd">
  <modelVersion>4.0.0</modelVersion>
  <groupId>emp_DB</groupId>
  <artifactId>Emp_DB_maven</artifactId>
  <version>0.0.1-SNAPSHOT</version>
  <dependencies>
    <!-- Hibernate 4.3.6 Final -->

    <dependency>

    <groupId>org.hibernate</groupId>

    <artifactId>hibernate-core</artifactId>

    <version>4.3.6.Final</version>

  </dependency>

    <!-- Mysql Connector -->

    <!-- added latest version of mysql connector -->
    <dependency>
    <groupId>mysql</groupId>
    <artifactId>mysql-connector-java</artifactId>
    <version>8.0.18</version>
    </dependency>

  </dependencies>
</project>
```

Employee Entity:

```
package employee_manage;

import javax.annotation.processing.Generated;
import javax.persistence.Column;
import javax.persistence.Entity;
import javax.persistence.GeneratedValue;
import javax.persistence.Id;
import javax.persistence.Table;
import javax.persistence.*;

@Entity
@Table(name = "employee")
public class Employee {

    @Id @GeneratedValue
    @Column(name = "id")
    private int id;

    @Column(name="first_name")
    private String firstname;

    @Column(name="last_name")
    private String lastname;

    @Column(name="salary")
    private float salary;

    public Employee() {}

    public int getId() {
        return id;
    }

    public void setId(int id) {
```

```
        this.id = id;
    }
    public String getFirstname() {
        return firstname;
    }
    public void setFirstname(String firstname) {
        this.firstname = firstname;
    }
    public String getLastname() {
        return lastname;
    }
    public void setLastname(String lastname) {
        this.lastname = lastname;
    }
    public float getSalary() {
        return salary;
    }
    public void setSalary(float salary) {
        this.salary = salary;
    }
}
```

Employee hibernate configuration file:

```
<!DOCTYPEhibernate-configurationPUBLIC
"-//Hibernate/Hibernate Configuration DTD 3.0//EN"
"http://hibernate.sourceforge.net/hibernate-configuration-3.0.dtd">
<hibernate-configuration>

<session-factory>

<propertyname="hibernate.bytecode.use_reflection_optimizer">>false</property
>

<propertyname="hibernate.connection.driver_class">com.mysql.jdbc.Driver</pr
operty>

<propertyname="hibernate.connection.url">jdbc:mysql://localhost:3306/employ
ee</property>

<propertyname="hibernate.connection.username">root</property>

<propertyname="hibernate.connection.password">root</property>

<propertyname="hibernate.dialect">org.hibernate.dialect.MySQLDialect</prope
rty>

<propertyname="show_sql">>true</property>

<mappingclass="employee_manage.manageemployee"></mapping>

</session-factory>

</hibernate-configuration>
```

Employee Manage program:

```
import java.util.List;
import java.util.Date;
import java.util.Iterator;
import org.hibernate.HibernateException;
import org.hibernate.Session;
import org.hibernate.Transaction;
import org.hibernate.cfg.AnnotationConfiguration;
import org.hibernate.SessionFactory;
```

```

import org.hibernate.cfg.Configuration;

@SuppressWarnings("deprecation")

public class manageemployee {

    //public class ManageEmployee {

private static SessionFactory factory;

    public static void main(String[] args) {

        try {

            factory = new AnnotationConfiguration().
configure().

                //addPackage("com.xyz") //add package if used.

addAnnotatedClass(Employee.class).

buildSessionFactory();

        } catch (Throwable ex) {

System.err.println("Failed to create sessionFactory object." + ex);

            throw new ExceptionInInitializerError(ex);

        }

manageemployee ME = new manageemployee();

        /* Add few employee records in database */

        Integer empID1 = ME.addEmployee1("Vignesh", "Peddi", 1000);

        Integer empID2 = ME.addEmployee1("Srihansh", "Sri", 5000);

        Integer empID3 = ME.addEmployee1("Venkatesh", "Peddi", 10000);

        Integer empID4 = ME.addEmployee1("vinay", "kumar", 25000);

        /* List down all the employees */

        //ME.listEmployees1();

        /* Update employee's records */

ME.updateEmployee1(empID1, 30000);

ME.updateEmployee1(empID2, 20000);

ME.updateEmployee1(empID3, 22000);

ME.updateEmployee1(empID4, 40000);

```

```

        /* Delete an employee from the database */
ME.deleteEmployee1(emplID1);
ME.deleteEmployee1(emplID2);

        /* Add an employee from the database */
ME.addEmployee1("shiva", "prasad", 12300);

        /* List down new list of the employees */
ME.listEmployees1();
    }

    /* Method to CREATE an employee in the database */
    public Integer addEmployee1(String fname, String lname, int salary){
        Session session = factory.openSession();

        Transaction tx = null;

        Integer employeeID = null;

        try {
            tx = session.beginTransaction();

            Employee employee = new Employee();
employee.setFirstname(fname);
employee.setLastname(lname);
employee.setSalary(salary);
employeeID = (Integer) session.save(employee);
tx.commit();

            } catch (HibernateException e) {
                if (tx!=null) tx.rollback();
e.printStackTrace();
            } finally {
session.close();
            }

            return employeeID;
        }
    }

```

```

/* Method to READ all the employees */
public void listEmployees1( ){
    Session session = factory.openSession();
    Transaction tx = null;
    try {
        tx = session.beginTransaction();
        List employees = session.createQuery("FROM Employee").list();
        for (Iterator iterator = employees.iterator(); iterator.hasNext();

Employee employee = (Employee) iterator.next();

        System.out.print("First Name: " + employee.getFirstname());
        System.out.print(" Last Name: " + employee.getLastname());
        System.out.println(" Salary: " + employee.getSalary());
    }
    tx.commit();
    } catch (HibernateException e) {
        if (tx!=null) tx.rollback();
    e.printStackTrace();
    } finally {
    session.close();
    }
}

/* Method to UPDATE salary for an employee */
public void updateEmployee1(Integer EmployeeID, int salary ){
    Session session = factory.openSession();
    Transaction tx = null;
    try {
        tx = session.beginTransaction()
        Employee employee = (Employee)session.get(Employee.class, EmployeeID);

```

```

employee.setSalary( salary );
session.update(employee);
tx.commit();

    } catch (HibernateException e) {
        if (tx!=null) tx.rollback();
e.printStackTrace();
    } finally {
session.close();
    }
}

/* Method to DELETE an employee from the records */
public void deleteEmployee1(Integer EmployeeID){
    Session session = factory.openSession();
    Transaction tx = null;
    try {
        tx = session.beginTransaction();
        Employee employee = (Employee)session.get(Employee.class, EmployeeID);
session.delete(employee);
tx.commit();
    } catch (HibernateException e) {
        if (tx!=null) tx.rollback();
e.printStackTrace();
    } finally {
session.close();
    }
}

public Integer addEmployee(String string, String string2, int i) {
    // TODO Auto-generated method stub
    return null;
}

```



```

    }

    public void deleteEmployee(Integer empID2) {

        // TODO Auto-generated method stub

    }

    public void updateEmployee(Integer empID1, int i) {

        // TODO Auto-generated method stub

    }

    public void listEmployees() {

        // TODO Auto-generated method stub

    }
}

```

Employee Table in Sql:

```

MySQL 8.0 Command Line Cli  x  +  -
| hibernate |
| information_schema |
| mysql |
| performance_schema |
| product |
| sys |
+-----+
7 rows in set (0.00 sec)

mysql> create table employee(id int auto_increment, first_name varchar(30), last_name varchar(30), salary float, primary key(id));
Query OK, 0 rows affected (0.01 sec)

mysql> use employee;
Database changed
mysql> desc employee;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| id | int | NO | PRI | NULL | auto_increment |
| first_name | varchar(30) | YES | | NULL | |
| last_name | varchar(30) | YES | | NULL | |
| salary | float | YES | | NULL | |
+-----+-----+-----+-----+-----+-----+
4 rows in set (0.00 sec)

mysql> select * from employee;
Empty set (0.00 sec)

mysql> select * from employee;
+-----+-----+-----+-----+
| id | first_name | last_name | salary |
+-----+-----+-----+-----+
| 1 | Vignesh | Peddi | 20000 |
| 2 | Srihansh | Sri | 10000 |
| 3 | Venkatesh | Peddi | 12000 |
| 4 | vinay | kumar | 30000 |
+-----+-----+-----+-----+
4 rows in set (0.00 sec)

mysql>

```

Employee update salary:

```
mysql> select * from employee;
+----+-----+-----+-----+
| id | first_name | last_name | salary |
+----+-----+-----+-----+
| 1 | Vignesh | Peddi | 20000 |
| 2 | Srihansh | Sri | 10000 |
| 3 | Venkatesh | Peddi | 12000 |
| 4 | vinay | kumar | 30000 |
| 5 | Vignesh | Peddi | 30000 |
| 6 | Srihansh | Sri | 20000 |
| 7 | Venkatesh | Peddi | 22000 |
| 8 | vinay | kumar | 40000 |
+----+-----+-----+-----+
8 rows in set (0.00 sec)

mysql> |
```

Delete Employee:

```
mysql> select * from employee;
+----+-----+-----+-----+
| id | first_name | last_name | salary |
+----+-----+-----+-----+
| 1 | Vignesh | Peddi | 20000 |
| 2 | Srihansh | Sri | 10000 |
| 3 | Venkatesh | Peddi | 12000 |
| 4 | vinay | kumar | 30000 |
| 5 | Vignesh | Peddi | 30000 |
| 6 | Srihansh | Sri | 20000 |
| 7 | Venkatesh | Peddi | 22000 |
| 8 | vinay | kumar | 40000 |
| 11 | Venkatesh | Peddi | 22000 |
| 12 | vinay | kumar | 40000 |
+----+-----+-----+-----+
10 rows in set (0.00 sec)

mysql>
```

Add Employee:

```
mysql> select * from employee;
+----+-----+-----+-----+
| id | first_name | last_name | salary |
+----+-----+-----+-----+
| 1 | Vignesh | Peddi | 20000 |
| 2 | Srihansh | Sri | 10000 |
| 3 | Venkatesh | Peddi | 12000 |
| 4 | vinay | kumar | 30000 |
| 5 | Vignesh | Peddi | 30000 |
| 6 | Srihansh | Sri | 20000 |
| 7 | Venkatesh | Peddi | 22000 |
| 8 | vinay | kumar | 40000 |
| 11 | Venkatesh | Peddi | 22000 |
| 12 | vinay | kumar | 40000 |
| 15 | Venkatesh | Peddi | 22000 |
| 16 | vinay | kumar | 40000 |
| 17 | shiva | prasad | 12300 |
+----+-----+-----+-----+
13 rows in set (0.00 sec)

mysql> |
```

2. Write and explain of hibernate.cfg and hibernate.hbm file usage in ORM.

Hibernate configuration file:

As Hibernate can operate in different environments, it requires a wide range of configuration parameters. These configurations contain the mapping information that provides different functionalities to Java classes. Generally, we provide database related mappings in the configuration file. Hibernate facilitates to provide the configurations either in an XML file (like hibernate.cfg.xml) or properties file (like hibernate.properties).

An instance of Configuration class allows specifying properties and mappings to applications. This class also builds an immutable **SessionFactory**.

We can acquire the Configuration class instance by instantiating it directly and specifying mappings in the configuration file. Use the addResource() method, if the mapping files are present in the classpath.

```
Configuration cfg = new configuration()
```

```
.addResource("employee.hbm.xml");
```

XML Based configuration:

1. <?xml version="1.0" encoding="UTF-8"?>
2. <!DOCTYPE hibernate-configuration PUBLIC
3. ["-//Hibernate/Hibernate Configuration DTD 5.3//EN"](#)
4. ["http://www.hibernate.org/dtd/hibernate-configuration-5.3.dtd"](http://www.hibernate.org/dtd/hibernate-configuration-5.3.dtd)>
5. <hibernate-configuration>
6. <session-factory>
- 7.
8. <property name="hbm2ddl.auto">update</property>
9. <property name="dialect">org.hibernate.dialect.Oracle9Dialect</property>
10. y>
10. <property name="connection.url">jdbc:oracle:thin:@localhost:1521:xe</property>
11. <property name="connection.username">system</property>
12. <property name="connection.password">jtp</property>
13. <property name="connection.driver_class">oracle.jdbc.driver.OracleDriver</property>
- 14.
15. </session-factory>
16. </hibernate-configuration>

Hibernate Configuration Properties:

Property	Description
hibernate.connection.driver_class	It represents the JDBC driver class.
hibernate.connection.url	It represents the JDBC URL.
hibernate.connection.username	It represents the database username.
hibernate.connection.password	It represents the database password.
Hibernate.connection.pool_size	It represents the maximum number of connections available in the connection pool.
hibernate.dialect	It represents the type of database used in hibernate to generate SQL statements for a particular relational database.

Hibernate Mapping file:

The full name of HBM is Hibernate Mapping. It is an XML **file** in which we define the mapping between POJO class to the database table and POJO class variables to table columns. The resource file **hibernate.cfg.xml**, which supports to represent the [Hibernate configuration](#) information. The connection.driver_class, connection.URL, connection.username, and connection.password property element that characterizes the JDBC connection information. The connection.pool_size is used to configure Hibernate's built-in connection pool how many connections to the pool. The Hibernate XML mapping file which includes the mapping correlation between the Java class and the database table. It is mostly named "xx.hbm.xml" and represents in the Hibernate configuration file "hibernate.cfg.xml."

XML Mapping File:

```
<hibernate-configuration>

<session-factory>

  <property name="hibernate.bytecode.use_reflection_optimizer">false</property>

  <property name="hibernate.connection.driver_class">com.mysql.jdbc.Driver</property>

  <property name="hibernate.connection.password">password</property>

  <property
name="hibernate.connection.url">jdbc:mysql://localhost:3306/demo</property>

  <property name="hibernate.connection.username">root</property>

  <property name="hibernate.dialect">org.hibernate.dialect.MySQLDialect</property>

  <property name="show_sql">true</property>

  <mapping resource="com/demo/common/HiberDemo.hbm.xml"></mapping>

</session-factory>

</hibernate-configuration>
```

Usage of the Mapping file:

- The mapping document is an XML document having **<hibernate-mapping>** as the root element, which contains all the **<class>** elements.
- The **<class>** elements are used to define specific mappings from a Java classes to the database tables. The Java class name is specified using the **name** attribute of the class element and the database **table** name is specified using the table attribute.
- The **<meta>** element is optional element and can be used to create the class description.

3. Explain advantages of HQL and Caching in Hibernate.

Advantages of HQL:

1.Open source and lightweight.

Hibernate framework is open source under the LGPL license and lightweight.

2.Fast Performance.

The performance of hibernate framework is fast because cache is internally used in hibernate framework. There are two types of cache in hibernate framework first level cache and second level cache. First level cache is enabled by default.

3.Database independent Query.

HQL (Hibernate Query Language) is the object-oriented version of SQL. It generates the database independent queries. So you don't need to write database specific queries. Before Hibernate, if database is changed for the project, we need to change the SQL query as well that leads to the maintenance problem.

4Automatic table creation.

Hibernate framework provides the facility to create the tables of the database automatically. So there is no need to create tables in the database manually.

5.Simplifies complex joins.

Fetching data from multiple tables is easy in hibernate framework.

6.Provide query statistics and Database status.

Hibernate supports Query cache and provide statistics about query and database status.

Caching in Hibernate:

Hibernate caching improves the performance of the application by pooling the object in the cache. It is useful when we have to fetch the same data multiple times.

There are mainly two types of caching.

- First level caching.
- Second level caching.

First level caching:

Session object holds the first level cache data. It is enabled by default. The first level cache data will not be available to entire application. An application can use many session object.

Second level caching:

SessionFactory object holds the second level cache data. The data stored in the second level cache will be available to entire application. But we need to enable it explicitly.

- EH (Easy Hibernate) Cache
- Swarm Cache
- OS Cache
- JBoss Cache.

4.Describe Sessionfactory, Session, Transection of objects.

Session factory:

SessionFactory is an interface. SessionFactory can be created by providing Configuration object, which will contain all DB related property details pulled from either hibernate.cfg.xml file or hibernate.properties file. SessionFactory is a factory for Session objects.

We can create one SessionFactory implementation per database in any application. If your application is referring to multiple databases, then you need to create one SessionFactory per database.

The SessionFactory is a heavyweight object; it is usually created during application start up and kept for later use. The SessionFactory is a thread safe object and used by all the threads of an application.

Session:

A **Session** is used to get a physical connection with a database. The Session object is lightweight and designed to be instantiated each time an interaction is needed with the database. Persistent objects are saved and retrieved through a Session object.

The session objects should not be kept open for a long time because they are not usually thread safe and they should be created and destroyed as needed. The main function of the Session is to offer, create, read, and delete operations for instances of mapped entity classes.

Transaction in object:

A transaction is associated with a Session and is usually instantiated by a call to `Session.beginTransaction()`. A single session might span multiple transactions. However, it is intended that there will be at most one uncommitted Transaction associated with a particular Session at any time.



