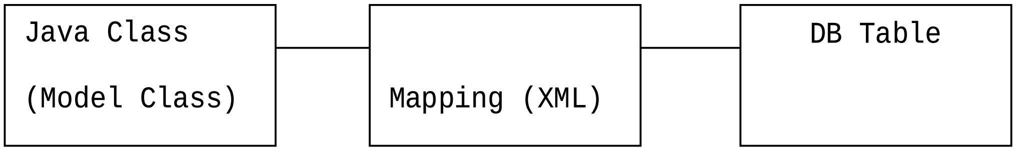
Hibernate

Object Relational Mapping (ORM): ORM is a theoretical approach which provides a concept of converting object to DB record and vice-version.

If follows are concept i.e., mapping it will be done in between java class java class and Database table.



Java Class

(Model Class)

Mapping (XML)

DB Table

Framework: Framework is a technologies and API's. Which provide a new concept a new concept by simply existing for a better programming is development. Frameworks are mainly designed for to reduce burden on programmer and faster development of application.

HIBERNATE: Hibernate is a ORM Framework. It follows java API's like JDBC, JNDI, JTA.

JDBC: Java Database Connectivity.

JNDI: Java Naming Directory Interface.

JTA: Java Transaction API.

And also uses XML (non-Java Technology).

- Hibernate provides In-built Persistency API to perform Single Row Operations with out SQL by programmer. Like insert (Save(), Delete(), Update()), read (get() or load()).
- Hibernate supports Transaction Management begin Transaction, Commit, rollback transaction etc...(in-built).
- Hibernate supports Connection Pooling (Multiple Connection are Maintained as a memory for re-using).
- Hibernate provides HQL (Hibernate Query Language) which is DB Independent.
- Dialect is a class/concept that generates SQL queries for Databases.

  Ex: Oracle Dialect, MYSQL Dialect etc….
- Hibernate Supports collection Mapping and using, like List, Set, Map etc…
- Hibernate provides combinations of designing of DB tables for Inheritance and Associations.
- Hibernate provides Caching for Reducing DB Network calls between program to Database.

Model Class: private <DT> <V> **Here DT: Data Type**

V: Variable

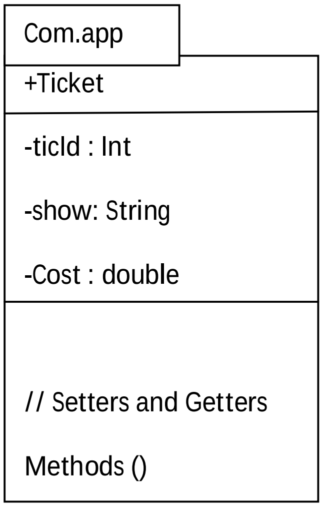
Syntax: Setter Method

```
Public void set<V> (<DT> <V>)
{
      this.<V>=<V>;
}
```

Syntax: Getter Method

```
Public <DT> get<V> ()
{
      Return <V>;
}
```

Example:



```
package com.app;

public class Ticket {
      private int ticId;
      private String show;
      private double cost;
      public int getTicId() {
            return ticId;
      }
      public void setTicId(int ticId) {
            this.ticId = ticId;
      }
      public String getShow() {
            return show;
```

```
    }
    public void setShow(String show) {
        this.show = show;
    }
    public double getCost() {
        return cost;
    }
    public void setCost(double cost) {
        this.cost = cost;
    }
    @Override
    public String toString() {
        return "Ticket [ticId=" + ticId + ", show=" + show + ", cost=" + 
cost
                + "]";
    }
}
```

Example:

Package com.one

Class +Details

Variables

-dtlId: int

-name: String

- val : double

- data: List<String>

- addrObj : Address

```
package com.app;
public class Details {
    private int dtlId;
    private String name;
    private double val;
    private List<String> data;
    private Address addrObj;
    public int getDtlId() {
        return dtlId;
    }
    public void setDtlId(int dtlId) {
        this.dtlId = dtlId;
    }
    public String getName() {
        return name;
    }
    public void setName(String name) {
        this.name = name;
    }
    public double getVal() {
        return val;
    }
    public void setVal(double val) {
        this.val = val;
    }
    public List<String> getData() {
        return data;
    }
    public void setData(List<String> data) {
        this.data = data;
    }
    public Address getAddrObj() {
        return addrObj;
    }
    public void setAddrObj(Address addrObj) {
        this.addrObj = addrObj;
    }
    @Override
    public String toString() {
        return "Details [dtlId=" + dtlId + ", name=" + name + ", val=" + val
                + "]";
    }
}
```

Hibernate Mapping File: To bind Java Class with database table, one XML file (with Format<file-name>.hbm.xml) is required to specify the mapping details.

Example: employee.hbm.xml

This file mapp’s Employee class with empTab.

For this equailant xml mapping code is

```
 <!DOCTYPE hibernate-mapping PUBLIC
"-//Hibernate/Hibernate Mapping DTD 3.0//EN"
"http://hibernate.sourceforge.net/hibernate-mapping-3.0.dtd">
<hibernate-mapping>
<class name="com.app.Empoyee" table=" ">
<id name="empNo" column=""/>
<property name="empName" length="20"/>
</class>
</hibernate-mapping>
```

Note: Here <id> indicates primary key of table to be binded. And <property> indicates field – column binding.

Hibernate Configuration: To provide details like connection properties, hibernate properties, database level properties, we need to specify. Key value pairs as Hibernate configuration (properties) file.

File name follows naming conversion: hibernate.cfg.xml.

hibernate.cfg.xml: To specify the configuration of the database hibernate.

Database details--→ driver_class, url, username, password, dialect, show_sql, hbm2ddl.autos.

Basic Connection Properties Are:

1. **Driver_class:** To specify in configuration file to unique to provide as a property with key as connection.driver_class and the value should be driver_class.

   Example: <property name=”connection.driver_class”>com.mysql.jdbc.Driver </property>

2. **URL:** It is a location of Resource. Which provides combination of URL=IP + PORTNUMBER + RESOURCENAME.

   Example: http://198.126.0.1:8089/TestService

   Jdbc.Oracle:@198.126.0.1:1521:XE.

Here http: and Jdbc, oracles are protocols.

Note: To specify this key is connection.url.

Example: <property
name=”connection.url”>jdbc:mysql://localhost:3306/test
</property>

3. **Username and Password:** These are known as resource access authentication details.

   To specify these keys are: Connection. username, Connection. password.

4. **Dialect:** It is classes defined by hibernate that generates SQL Queries to be executed at DB level based on Hibernate programs and HQL.

   Example: org.hibernate.dialect.MySQLDialect.

   org.hibernate.dialect.OracleDialect.

5. **Show_sql:** It display the generated query by dialect, by default this feature is turned off (false), to activate provide value as true.

6. **Hbm2ddl.auto:** From hibernate mapping file a DB table create /modification/validation will be performed.

   Possible values:

   i: create

   ii: create-drop

   iii: update

   iv: validate

Configuration object and loading cfg file writing hibernate main program.

To writing hibernate that perform basic

Save, update, and delete, sets.

Step by step: configuration object
sesionFactory object
session object
transaction object
operation (like save, update….)
commit transaction
close session.

Writing Hibernate Program to Save Java Object as Record in DB:

To write Hibernate code 4 files (2 java, 2 xml) are required they are:

1. Java class that represents Database Table.

   Example: Account.java, Employee.java.

2. Mapping XML file that shows connectivity of java class and DB table.

   Example: mapping.hbm.xml, accout.hbm.xml.

3. Configurartion xml file, That provides details like properties and Mapping resourses.

   Config = properties + Mapping resources

   ***** **It must follow a naming rule like: hibernate.cfg.xml.**

4. Main program to perform Specific operation.

   Example: save().

POJO (Plane Old Java Object): It is a simple class, which is not binded with any technology.

It follows below rules likes:

- POJO class must not extend or implements any class or interface (Technology related API like Servlet, Swing, and Struts etc…)
- POJO class must not have any annotation applied on class/ members level. (Technology related @Id, @Controller, @WebServlet etc…)

Java Bean:

- Clas must be public (recommended to write package structure and no modifiers like final, abstract etc….)
- Always provide Default / No Arguments Constructors even parameterized constructors also allowed. But these must be public type.
- Writing fields (instance variables are optional, but if defined, they must private type.
- For every field setter and getter methods are required (Alt+Shift+s r).
- hashCode(), equals(), toString() --→ All methods class. Java bean class override super class (object class) method like.

  toString():String, hashCode():int, equals():Boolean.

  Note: This is a Optional RULE.

  Shortcuts are: ALT+Shift+s s → toString()

  ALT+Shift+s h → hashCode and equals()

  ALT+Shift+s o → defaultContructors()

  ALT+Shift+s r → setters and getters()

  Ctrl+Shift+ T → Open type (predefined class)
  EX: *STR*Buff*.

Ctrl+Shift+ r → Open Resource
EX: *emp*dao*impl*hibernate.

Note: on printing reference variable to console using system.out.println() internally it calls object class toString() method.

Object class toString() return class name and @ Symbol appended with hashcode in hexa-decimal format.

Mapping File concepts Questions:

1. <property name=”empName” column=”ename”/>

   For column ename default data is null. And for this not-null is false, that means it accepts null data table.

   To avoid null data into table provide condition not-null=”true”.

   <property name=”empName” column=”ename” not-null=”true”/>.

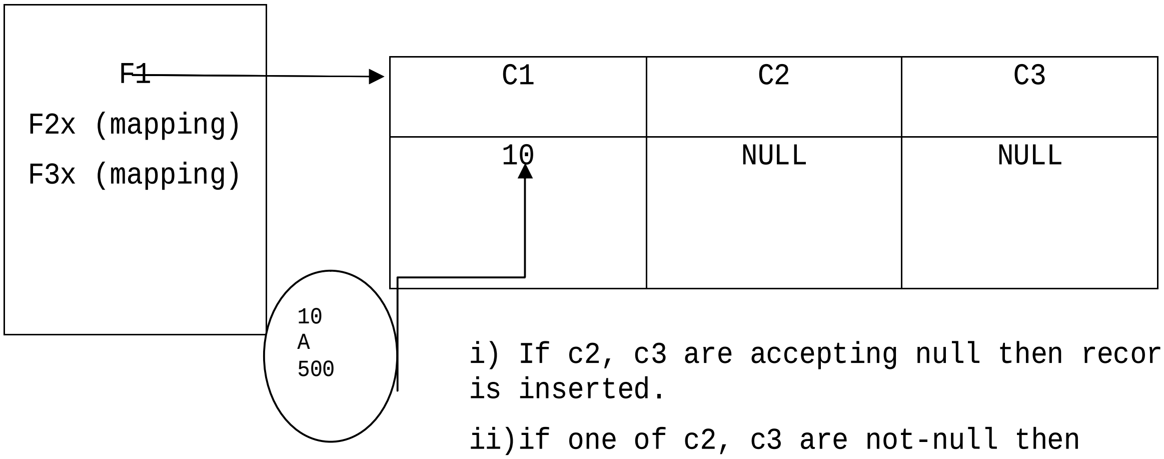
2. If no mapping found between fields and columns table will not read data even through sent by program that means reads default data.

   Example: null data

3. Class must have either <id> or <Compositeid> and <property> tag is optional.

   In DTD id |compositeid is having no symbol, where property is *(0-N).

   Here 0 mean zero, N mean null.



C1	C2	C3
10	NULL	NULL

i) If c2, c3 are accepting null then record is inserted.

ii)if one of c2, c3 are not-null then record is rejected.

4. On proving no DB values at Mapping code like No table name and column names, in such case, it takes class details to Constructor validate tables.

```
<hibernate-mapping   package=”com.app”>

<class name=”statusMaster”>

<id name=”statId”/>

<property name=”details”/>
```

```
<property name=”costforData”>
</class>
</hibernate-mapping>
<!.... for this table name is status master and column name are
statid, details, costfordata>
```

Note: In all Data base – SQL query is case insensitive.

```
Example: Select * From Employee;
         Select * from employee;
         Select * FROM EMPLOYEE;
```

Return same data. But data is case sensitive.

In case of MySQL:

Data also case insensitive

```
Select * from employee where ename=’ABCD’;
Select * from employee where ename=’abcd’;
```

Return same data.

File Locations: If mapping file is available under a package or folder than, location must be specified as

<mapping resource=”com/app/status.hbm.xml”/>

If Configuration file:

Case i: Having name as hibernate.cfg.xml and location is src.

Then in main code is cfg.configure() is required.

Case ii: Having name as details.cfg.xml and location is src.

Then main code is **cfg.configure(“details.cfg.xml”).**

Case iii: Having name as details.cfg.xml and location is com/app.

Main code is cfg.configure(“com/app/detail.cfg.xml”).

Java Bean: java bean does not support writing of annotation if should not be or implements any class Serializable interface.

Auto boxing: A primitive value can be stored in wrapper type; automatically value is group to be converted into object format.

Example:

```
int x=10; // primitive type
Interger s=10; //wrapper to object-auto boxing.
```

Note: Auto boxing available only after jdk 1.5 version.

Up casting: A super can store sub class or Implemented object.

Example:

```
class A { }
Class B extends A { }
A a1=new B();
```

Auto Boxing & Up Casting:

```
          Serilizable s1=10;
          Here 10 is Wrapped to Integer type in
```

Step 1: Integer x=new Integer (10); or x=10;

```
          Serilizable s1= ____________
```

Then it is assigned to serilizable type as upcasted object in step2.

Step 2: Serilizable s1=new Integer (10);

```
                         (or)
          Serilizable s1=x;
```

Up casting and down casting: If two classes are inheritance relation, then internal conversion can be done from subclass to super class to stub.

```
Example: class A { }
          Class B extends A { }
          New for statement
     B b1=new B(); create memory for itself and super types.
```

Save(): This is defined in Session.

Save (object): Serilizable this method, takes input as object, which is to be stored in DB, and returns primary key data in serilizable type. That we can downcast to required type.

Main: Employee emp=new Employee();

```
          emp.setEmpId(100);
          .
          .
          Serilizable s1=session.save (emp);
          Int id=(integer) s1; //downcasting and auto unboxing
```

Update (): This method updates the object based on primary key value.

Update (object): void

Example: Employee emp=new Employee();

```
               emp.setEmpId(101);
               .
               .
               Session.update(emp);
```

Save or update(): This method will try to check record exit or not by writing select query.

Get(): This method defined in session API. It returns DB record to java object based on primary key in serilizable format.

Example: getmethod takes two parameters, class notation and primary key value.

Format 1: get(String,Serilizable): object.

Example: object ob=ses.get(“com.app.Student”,101);

Format 2: get(class,Serilizable): object.

Example: object ob=ses.get(“Student.class”,101);

Object ob=null;

Note: In case of No data found based on given primary key input, and then get method returns null data.

Program Main Method:

```
Public class Test{
Public static void main (String[] arg){
Configuration cfg=null;
SessionFactory factory=null;
Session ses=null;
//Transaction tx=null;
Try{
    Cfg=new Configuration();
    Cfg.configuration();
    Ses=factory.OpenSession();
    //Tx=ses.beginTranscation();
    //Tx.begin();
    Object ob=ses.get(“com.app.Student”,101);
    Student s1=(Student)ob;
    //Tx.commit();
}catch(Exception e){
    //tx.rollback();
    e.printStackTrace();
    }finally{
        If(ses!=null){
            Ses.close();
        }    }
```

```
          System.out.println(“Done”);
}
```

Note: get method internally query select query for this operation transaction management this optional. For non-select queries like save(insert), update, delete etc….is transaction is required.

Load(): This method hits session cache to get the object, if object found then returns object, else it returns.

Excetion: ObjectNotFounException: No row with the given identifier exists.

In case of get, it hits DB table and returns object to session memory, the loads into application, if no data found then returns null.

Example: for load method

```
Student std=(Student)ses.load(student.class,101);
```

Note: 1) In Transaction Management **begin()** method will be called automatically.

2) To remove one object from session memory use **evict(object)** method.

3) To remove all objects from session memory use clear(), that will not close session.

4) To remove object from session memory and close session, use close() method from session.

5) Object states in Hibernate:

1. Newly created: transient
2. Available in session: persistence
3. Removed from session: Detached

6) hibernate configuration keys can be specified as

Hibernate.connection.driver_class (or) driver_class

Here hibernate keyword is optional at configuration level.

Hibernate Generator: To generator a primary key instead of reading from end user either predefined class or user defined class is used even through value is provided by end client (or) program. Hibernate Generator will **omit** the value. To define generator to primary key column use below.

Syntax: <generator class=”______________ “/>

Generator class Name

Types of Generators: In hibernate Generators are categories into two types.

1. Pre-define Generator
2. User-define Generator

Pre-define Generator: i) Sequence Generator (oracle sequence)

ii) Identity Generator

iii) increment Generator (max+1).

iv) hilow Generator, Assigned, native.

Example Program: In this stdId is considered as primary key. For this to specify Generator code should be provided in mapping file(__________.hbm.xml).

If we don’t provide any generator the primary key value should be entered manually.

```
Ex: <class name=”com.app.Student” table=”stdTab”>
      <id name=”stdId” column=”sid”>
      <generator class=”increment”/>
      </id>
      <property name=” ” column=” ”  />
      </class>
```

User-define Generator: A Programmer can define his own generation logic for primary key value. To define user define generator.

Step 1: create a class that implement identifier generator.

IdentifierGenerator(org.hibernate.id.IdentiferGenerator)

Step 2: override generation method.

Step 3: Define Generation Logic and return value.

```
Public class MyGen implements IdentiferGenerators
{
Public Serializable generate(SessionImplementor arg0,Object arg1) throws HibernateException{
Date d=new Date();
String sid=”GEN”;
Random r=new Random();
Int x=r.nextInt(1000);
Sid=sid+(d.getYear()+1900)+”-“+(d.getMonth()+1)+d.getDate()+” “ + x;
Return sid;
}
}
```

Configuration code for providing user define generator:

This should be mapped in hibernate mapping file we have to specify fully qualified name of generate class.

```
Ex: <id name=”stdId” column=”sid”>
        <generator class=”com.app.MyGen”/>
```

Creating a Sequence in Oracle:

```
Create SEQUENCE “HIBERNATE_SEQUENCE” increment by 20 start with 140;
```

Oracle 10gXE:

Start→all programs → oracle 10gXE → go to Data base Homepage (It opens a browser to login) → Enter user name and password (Ex: system / system) → click on administration → Data base User → create button → provide username password and confirm password→ Select DBA (check box) and click on create button → logout and login with new user → select object Browser (or) SQL>> SQL Command.

Predefined Generators:

1. **Assigned:** This is the default generator. It indicates read values from object for primary key column. In case if we do not provide any sequence this will be activated by default as below.

   ```
   Ex: <id name=”stdId” column=”sid”/>
           Equals to
           <id name=”stdId” column=”sid”>
               <generator class=”assigned”/>
           </id>
   ```

2. **Increment:** It provides next primary key value based on max number of exited values and increments +1.

   ```
   Ex: <id name=”stdId” coloumn=”sid”>
           <generator class=”increment”/>
       </id>
   ```

3. **Sequence:** It follows a data base sequence to generate a number series.

   Note: Hibernate search by default a sequence name as hibernate_seqence.

   ```
   Ex: <id name=”stdId” coloumn=”sid”>
           <generator class=”sequence”/>
       </id>
   ```

   Note: To provide different sequence name, use a parameter, to generator as below.

   ```
   Ex: <id name=”stdId” coloumn=”sid”>
           <generator class=”sequence”>
           <param name=”sequence”>Custom_Sequence</param>
   ```

```
          </generator>
     </id>
```

4. **Identity Generator:** This generator is data base dependent, this is implemented by MySQL (Auto-increment), Sybase (max+1), DB (Max+1,Max+n).

   Note: In case of MySQL it generates numbers with +1 of previous number.

```
          Ex: <id name=”stdId” coloumn=”sid”>
               <generator class=”identity”/>
          </id>
```

   Identity Generator is not applicable for oracle DB. This generator uses integer types.

5. **UUID:** Universal Unique Id. It is an hexadecimal represent is string datatype, which is generator based on same dynamic properties like, Database details, date and time, IPaddress, OS proportion, along with record no etc….

```
     Ex: <id name=”stdId” coloumn=”sid”>
               <generator class=”uuid”/>
          </id>
     Public class Student {
     Private String empid;
                                   For UUID
     }
```

6. **Hilo:** This is a number generation algorithm. which follows initial value (20=1) and the next value 215 of previous value.

   Hilo=Hibernate unique key.

   Next level → value + 2 15

   Here hibernate_unique_key represent the current level data increased to table.

   Ex: if 5 records are available in DB, then the next value is 5. For that main table data, next record value will be added with 215 i.e.

7. **Native:** It represent generators concept at DB level, related to database and which is default in database are, in this case hibernate component (or) programmer are not going to provide any value for different DBs, different algorithm will selected automatically.

```
          Ex: <id name=”stdId” coloumn=”sid”>
               <generator class=”native”/>
```

```
</id>
```

For oracle database: user sequence (hibernate_sequence).

For MySQL: user identity (auto_increment).

User defined Generators:

Composite-Primary Key: Combination of more than one column behaves like primary key is known as composite primary key.

Note: composite-primary key class must implement serializable interface.

Java code:

```
Public class Employee implements serializable {
      Private int empId;
      Private String empName;
      Private double empSal;
      // Setters and Getters Method
      }
```

Eid	Ename	Esal
101	A	-
101	B	-
101	C	-
102	A	-
102	A	-
102	B	-

XML code:

```
      <hibernate-mapping package=”com.app”>
      <class name=”Employee” table=”etab”>
      <Composite-id>
            <key-property name=”empId” column=”eid”/>
            <key-property name=”empName” column=”ename”/>
      </composite-id>
      <property name=”empSal” column=”esal”>
      </class>
      </hibernate-mapping>
```

First Program: Hibernate jars files add in eclise Bulidpath.

 TWO JAVA FILES:
 TWO XML FILES:

```
package com.app;

public class Student {
	private int stdId;
	private String stdName;
	private double stdFee;
	public int getStdId() {
		return stdId;
	}
	public void setStdId(int stdId) {
		this.stdId = stdId;
	}
	public String getStdName() {
		return stdName;
	}
	public void setStdName(String stdName) {
		this.stdName = stdName;
	}
	public double getStdFee() {
		return stdFee;
	}
	public void setStdFee(double stdFee) {
		this.stdFee = stdFee;
	}
	@Override
	public String toString() {
		return "Student [stdId=" + stdId + ", stdName=" + stdName + ", 
stdFee="
				+ stdFee + "]";
}  }
```

```
<?xml version="1.0" encoding="UTF-8"?>

<!DOCTYPE hibernate-mapping PUBLIC
    "-//Hibernate/Hibernate Mapping DTD 3.0//EN"
    "http://www.hibernate.org/dtd/hibernate-mapping-3.0.dtd">
   <hibernate-mapping package="com.app">
  <class name="Student" table="stutab">
           <id name="stdId" column="stdid"/>
           <property name="stdName" column="stdname"/>
           <property name="stdFee" column="stdfee"/>
      </class>
  </hibernate-mapping>
```

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE hibernate-configuration PUBLIC
      "-//Hibernate/Hibernate Configuration DTD 3.0//EN"
      "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">

        <hibernate-configuration>
        <session-factory>
        <property
name="connection.driver_class">oracle.jdbc.driver.OracleDriver</property>
        <property
name="connection.url">jdbc:oracle:thin:@localhost:1521:XE</property>
        <property name="connection.username">system</property>
        <property name="connection.password">system</property>
        <property
name="dialect">org.hibernate.dialect.OracleDialect</property>
        <property name="show_sql">true</property>
        <property name="format_sql">true</property>
        <property name="hbm2ddl.auto">create</property>
        <mapping resource = "student.hbm.xml"/>
        </session-factory>
        </hibernate-configuration>
```

```
package com.app;
import org.hibernate.Session;

import org.hibernate.SessionFactory;
import org.hibernate.Transaction;
import org.hibernate.cfg.Configuration;


public class Test {
           public static void main (String[] arg){
           Configuration cfg=new Configuration();
           cfg=cfg.configure();
           SessionFactory sf=cfg.buildSessionFactory();
           Session ses=sf.openSession();
           Transaction tx=ses.beginTransaction();
           tx.begin();
           Student stu = new Student();
           stu.setStdId(910);
           stu.setStdName("AAAbbbb");
           stu.setStdFee(54533.42);
           ses.save(stu);
           tx.commit();
           ses.close();
           System.out.println(stu);
           System.out.println("done");
           }
           }
```

Output:

```
SLF4J: Failed to load class "org.slf4j.impl.StaticLoggerBinder".
```

```
SLF4J: Defaulting to no-operation (NOP) logger implementation
SLF4J: See http://www.slf4j.org/codes.html#StaticLoggerBinder for further details.
Hibernate:insert into stutab(stdname, stdfee, stdid) values(?, ?, ?)
Student [stdId=910, stdName=AAAbbbb, stdFee=54533.42]
done
```

HQL

HQL (Hibernate Query Language): SQL Queries are database dependent. This Queries uses table names and column names to get the data and these Queries are case insensitive.

Ex: select * from emptab;

Select * from EMPTAB; the same

HQL Queries are database independent. HQL Query construction uses class name and field names.

```
Ex: public class com.app.Employee{
        Public int empId;
        Public String empName;     }
```

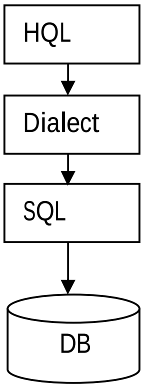
HQL Query: Select empName from com.app.Employee

This is fieldname   This is Qualified class name.

Note: HQL Query will be connected into SQL Query by using Dialect. That will be executed on Database.

HQL Queries are case sensitive at class name and Field name etc…. but not at SQL classes.

Ex: select, from, where, group by, having etc….



→To write HQL Queries and to get the data use Query APS.

Query (org.hibernate).

→To create Query object use methods create Query.

createQuery (String): Query.

→To list out all the records in “Query” class use a method.

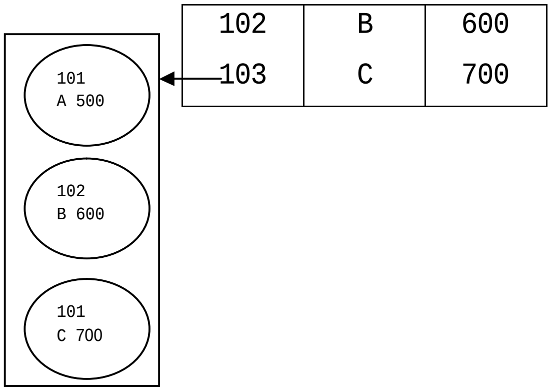
List():List.

→This List () return data in the form of list of objects.

Eid	Ename	Esal
101	A	500

HQL

1. Model class Student.
2. Mapping code (XML) student.hbm.xml.
3. Configuration code (XML) hibernate.cfg.xml.
4. Main Program.



102	B	600
103	C	700

```
Main program:
Public class Main{
      Public static void main (String[] arg){
      //common steps -begin
Configuration cfg=null;
      SessionFactory factory=null;
      Session ses=null;
      Transaction tx=null;
      Try{
            Cfg=new Configuration();
            Cfg.configuration();
            Ses=factory.OpenSession();
            Tx=ses.beginTranscation();
            //common steps end.
            //For HQL
            String hql=”from com.app.Student”;
            Query qry=ses.createQuery(hql);
            List<Student> stdList=qry.list();
            Iterator<Student> stditr=stdList.iterator();
            /* End HQL

//* Display Data
//display format-1 using with while iterator.
      While(stditr.hasNext())
{
```

```
Student student=stditr.next();
System.out.println(Student.getStdName());
}
//display format-2
      System.out.println (stdList);
//format 3
For( Student std:stdList)
{
System.out.println(std);
}
//common steps -begin
            Tx.commit();
      }catch(Exception e){
            //tx.rollback();
            e.printStackTrace();
            }finally{
                  If(ses!=null){
                        Ses.close();
                  }     }//end-common steps
            System.out.println("Done");
}
}
```

Pagination using Hibernate: In Query interface hibernate two methods.

```
      setFirstResult(int);
      setMaxResult(int);
```

Here setFirstResult index Number start from zero.

And MaxResult specifies Max number of records in the result, if can be less than specified length but not going to exceed the length.

```
      Inputs:     pageSize=(int type);
                  pageNumber=(int type);
                  firstNumber=(pageNumber-1)*pageSize;
                  NoOfPages=(int type)TotalRecords/pageSize;
```

Ex program: I. Student.java (stdId,stdName,stdFee)

II. student.hbm.xml.

III. Hibernate.cfg.xml.

iv. Main program.

Main program:

```
Public class Test{
     Public static void main (String[] arg){
     //pagination inputs
int pageSize=5;
int pageNumber=2;
//common steps -begin
Configuration cfg=null;
     SessionFactory factory=null;
     Session ses=null;
     Transaction tx=null;
     Try{
           Cfg=new Configuration();
           Cfg.configuration();
           Ses=factory.OpenSession();
           Tx=ses.beginTranscation();
           //common steps end.
           //For HQL with program
           String hql=”from Student.class.getName()”;
           Query qry=ses.createQuery(hql);
           qry.setFirstResult((pageNumber-1)*pageSize);
           qry.setMaxResult(pageSize);

           List<Student> listObj=qry.list();
           Iterator<Student> stditr=listObj.iterator();
           /* End HQL

//* Display Data
//display format-1 using with while iterator.
     While(stditr.hasNext())
{
Student student=(Student)stdItr.next();
System.out.println(Student);
}
//common steps -begin
           Tx.commit();
     }catch(Exception e){
           //tx.rollback();
           e.printStackTrace();
           }finally{
                 If(ses!=null){
                       Ses.close();
                 }     }//end-common steps
           System.out.println("Done");
}
}
```

Partial data loading from table:

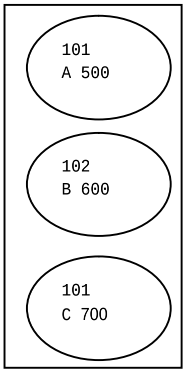
Instead of reading all columns data, we can even specify few columns required. Then only specified columns data will be loaded, this concept is known as partial loading.

Data will be returned in list of object array format (List <object[]>)

Case 1: full record loading (with all columns data)

hql="from com.app.Student"

**Data comes in Student Object Format.



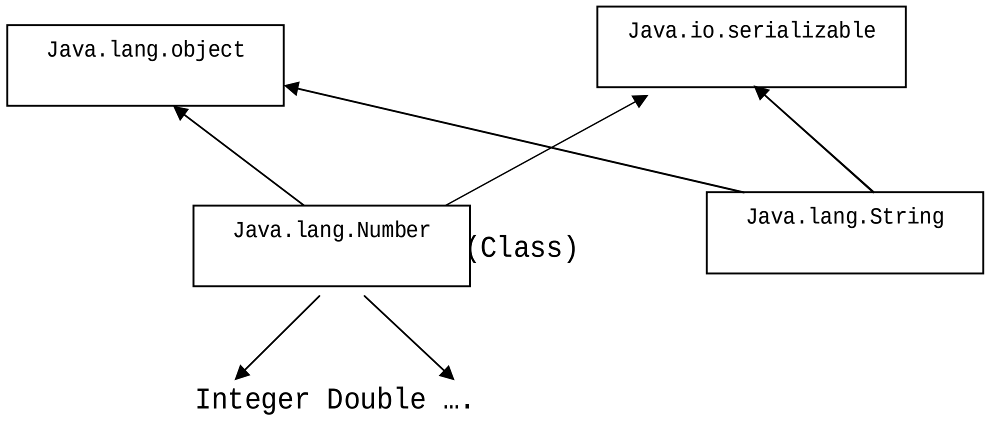
Eid	Ename	Esal
101	A	500
102	B	600
103	C	700

Case 2: Partial record loading (with few columns data)

Hql= "select stdId, stdName from com.app.Student"

**Data will be returned in ObjectArrayFormat.

Super Types for Wrappers & String class:



Case 3: Partial Data loading (only one column Data) can be represented in list object format (on list of its own type format).

Ex: stdId - Int tye can be represented as

1. List<Integer>
2. List<Number>
3. List <Object> ****
4. List <serializable>

Note: Here Hibernate stores data in List as Object format only, later it will be “down casted” to specific type.

Named Query: A HQL Query can be declared in Mapping file (Global Declaration) and if can be read any location.

Ex: Student.hbm.xml

```
<hibernate-mapping  package=”    ”>
<class> ….</class>
<Query name=”stdDataQry”>
Select stdName from com.app.Student
</Query>
</hibernate-mapping>
```

To read / use this query in program, use a method getNamedQuery(String): Query.

Ex: Program

```
//configuration
//sessionfactory
//session
```

```
//transaction

Query qry=ses.getNamedQuery(“stdDataQry”);

List<object>   listData=qry.list();

//display data using iterator.
```

Passing parameters to HQL Query: In hibernate Data can be passed to Query in two ways. 1. Positional Parameters(?) 2. Named Parameters(:name)

1. **Positional Parameters(?):** Positions always starts with number zero and we can specify multiple parameters also.

    ```
    Ex: String hql=”select stdId,stdName,stdFee from com.app.Student
    where stdId=? And stdName=?”;

    Query qry=ses.createQuery(hql);

    qry.setParameter(0,16);

    qry.setParameter(1,”ABCD”);

    List data=qry.list();
    ```

    Note: setParameter (int,object) method takes values in object format (up casted Data) instead this, we can setXXX() (SetterMethods).

    ```
    Query qry=ses.createQuery(hql);

    qry.setInteger(0,16);

    qry.setString(1,”ABCD”);

    List data=qry.list();
    ```

2. **Named Parameters(:name):** Instead of position number we can specify a name to pass a value (indexing), which is more better than sequencing.

    To specify use colon (:) with name.

    ```
    Ex: from com.app.Employee where eid:DataId
    ```

    To set the value, we can use setParameter(string, object) Method.

    ```
    Program: String hql=”select stdId,stdName,stdFee from
    com.app.Student where stdId=:a And stdName=:b”;

    Query qry=ses.createQuery(hql);

    qry.setParameter(“a”,16);

    qry.setParameter(“b”,”ABCDEF”);

      (or)


    qry.setInteger(“a”,16);

    qry.setString(“b”,”ABCD”);
    ```

NOTE: Combinations of Positional and Named Parameters:

```
? ? ? : a  (allowed)
? : a ?: b (Not allowed)
: a ?      (Not allowed)
? :a       (allowed)
```

Positional parameters are not allowed after named parameters.

>> In Case positional parameters are used after named parameters, then hibernate throws QuerySyntaxError.

Counting numbers of records HQL Query:

Format 1: String hql="Select Count(*) from com.app.student";

Format 2: String hql="select count(stdId) from com.app.student";

Note: i. Count(1) not valid at HQL level but valid at SQL level.

ii. In case of Query return one object / on value than it can stored in list or object. To store list use list() method. To store in object use uniqueResult() method.

```
Ex: string hql="select count(*) from com.app.Student";
     Query qry=ses.createQuery(hql);
     List<object> list=qry=qrylist();
     System.out.println(list);


          (or)
     Number ob=(Number)qry.uniqueResult();
```

Unique Result ():(Object): This method is used to store one value/one object type object (Employee, Student type etc…). In case of Query return more than one value than it will throw exception.

List (): List method can be used event for one record storage also, but default list will 10 size, memory will be used for one object, reaming wasted.

HQL Query for Non-Select Operations: HQL Queries can also be written for non-select operation like update, delete, insert etc….

But for basic operations like save, update, delete core API is used in Hibernate. HQL bulk updations and bulk deletions or partial updations can be done using Non-Select Operations.

Ex: Update one column value based on id. To perform this on query object call a method “execut update():int”. It returns no of records updated in DB.

Ex: Program

```
String hql=”update com.app.Student set “+” stdName=:name, stdFee=:fee
“+” where stdId=:Id;

Query query=ses.createQuery(hql);
query.setParameter(“name”,”IIjkl”);
query.setParameter(“fee”,652.32);
query.setParameter(“id”,3);
int x1=query.executeUpdate();
System.out.println(x1);
Tx.commit();
```

Dynamic Query Construction using String Buffer and Conditional Based:

Configure above class to relate the mapping table in mapping file.

Ex: Student.hbm.xml

Configure hibernate properties and mapping resources in “hibernate.hbm.xml” file.

Ex: hibernate.hbm.xml.

Define main class, by using a conditional based Query construction and data passing.

For Query construction string buffers are used later string buffer can be converted to String format using toString() Method.

In case of String Buffer append () method is used to add or concatenate type inputs or Query object (Buffer object).

Ex: Query construction using String Buffer class.

Select stdName from com.app.Student where stdId=:id.

Above Query is constructed using String Buffer as specified below.

Code:

```
I)   StringBuffer hql=new StringBuffer(“select stdId”); or

(“select sobj.stdId”).append(“from”+ Student.class.getName()+”as
sObj”).append(“where”).append(“sObj.stdId=:sid”);

System.out.println(hql);


II)  Public static void main(String[] args)

     { StringBuffer hql=new StringBuffer (“select sobj.stdName)
     .append(“from”+Student.class.getName()+”as
     sobj”).append(“where”).append(“sobj.stdId:=sid”);

     System.out.println(hql);
```

Output for the above query is : select sobj.stdName from com.app.Student as sobj where sobj.stdId=:sid

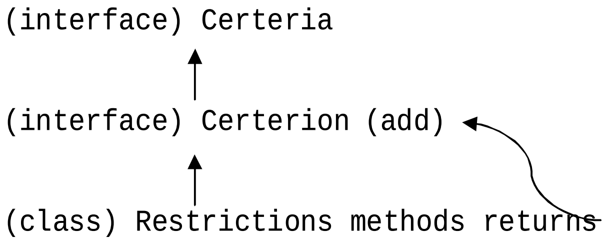
Criteria API: This API is designed in hibernate to read the data (select data) from a DB table with out any query construction by programmer. Instead programmer hibernate will construct Query. It follows internally connected with 2 APIs they are I) Restrictions II) Projections.

I) **Restrictions:** These indicates simple where clause conditions

Ex: >(gt), <(lt), <=(ge), >=(le, =eg, !=ne, between, and, or etc….

Every restriction returns “criterion” object. That could be added to criteria object.

Design Model:



(interface) Certeria

(interface) Certerion (add)

(class) Restrictions methods returns

Code Sample:

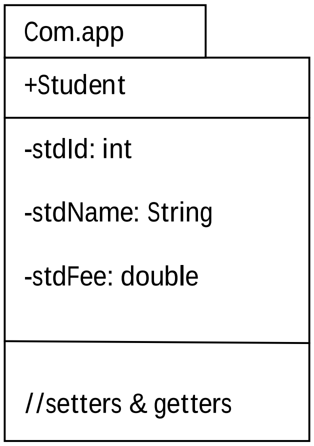
```
//config

//sesstonfactory

//session

//transactions operations

//commit/rollback

// session close
```

Operations Over criteria: By using create criteria (class):

Criteria methods, table data can be selected that reads data in the list format.

EX: Stdtab

Sid	Sname	Sfee



Main program:

```
Criteria criteria=ses.createCriteria(Student.class)
//above line meaning= select * from stdtab;
List list=criteria.list();
System.out.println(list);
           (or)
List<Student> list=criteria.list();
Iterator<student> iterator=list.iterator();
While(iterator.hasNext())
{ Student student=(student)iterator.next();
System.out.println(student);
}
```

Applying restrictions on criteria:

```
     Code: 1. empId >= 200
     Select * from emp where empId>=200;
           StdId>=200
```

Format 1:

```
Criteria criteria=ses.criteria(Student.class);
Criteria.add(Restrictins.ge(“stdID”,200));
```

Format 2:

```
Criteria criteria=Restrictions.get(“stdId”,200);
Criteria.add(criteria);
```

2.Multile Conditons: StdId>200 or stdName like ‘%D’.

Format 1

```
Criteria criteria=ses.create Criteria(Student.class);
Criterion criterion1=Restrictions.gt(“stdId”,200);
Criterion criterion2=Restrictions.ilike(“stdName”,”%D”);
Criterion criterion3=Restrictions.Or(criterion1,criterion2);
Criteria.add(criterion3);
```

Format 2

```
Criteria criteria=ses.create Criteria(Student.class);
Criteria.add(Restricitons.or(Restrictions.gt(“std”,200),Restrictions,ilike(“stdName”,”%D”)));
```

Examples:

```
 I  Eid>=100 || ename like %AJ%
                      && (esak=”5000.36” || estatus ilike “%A%”));
           Criteria.add(Restrictions.ge(“eid”, 100);
                            Restrictions.like(“ename”,”%AJ”);
                            Restrictions.eq(“esal”,500.36);
                            Restrictions.ilike(“estatus”, “%A%”));
```

II Multile conditions

```
stdId>200 or std Name Ignore case like ‘%D’
```

III stdId between 20 and 30

```
Criteria.add(Restrictions.between(“stdId”,20,30));
```

iv) where stdName is Ajay

```
criteria.add(Restrictions.eq(“stdName”,”Ajay”);
```

V) stdId!=10(notequals)

```
Restrictions.ne(“stdId”,10);
```

VI) get all records where stdName is not null

```
Restrictions.isNotNull(“StdId”,10);
```

SQL: where stdId!=null or where stdId is not null;

VII) get all records where stdName is null

```
Restrictions.isNull(“stdName”);
```

SQL: where stdId=null;

VIII) get all records where stdName is empty

```
Restrictions.isempty(“stdName”);
```

SQL: where stdName=’ ‘;

IX) get all records where stdName is not empty

```
Restrictions.isNotEmpty(“stdName”);
```

SQL: where stdId!=’ ‘;

II. **Projections:** It specifies, specifies columns need to be selected instead of all columns data. Criteria select all columns data that can be restricted to specific columns using projections.

To specify one projection: Use method property () in projections class and that can be set to criteria object using set Projection.

In case if we specify more than one projection using projection. Property (“--”) than last projection will be considered as only one projection need to be applied.

Code: create criteria object

Use criteria add method to add projections use

```
    Projections.property(“FiledName”);
```

I) Criteria criteria=ses.createCriteria(Student.class);

```
Criteria.setProjection(Projections.property(“stdId”));
    List list=criteria.list();
```

II) Criteria.setProjection(projections.property(“stdId”));

```
Criteria.setProjection(projections.property(“stdName”));
Criteria.setProjection(projections.property(“stdFee”));
   List list=criteria.list();
```

Projection to specify more than one column / Field Data:

→Create projections list object.

→Add all projections properties to list

→Set list to criteria object.

```
Criteria criteria=ses.createCriteria(Student.class);
ProectionList list=proections.projectionList();
Plist.add(Projections.property(“stdName”));
Plist.add(Projections.property(“stdFee”));
Criteria.setProjection(plist);
List<Object[]> list=criteria.list();
```

Hibernate collection Mapping:

Hibernate supports collection like

List (list and Bag)

Set

Map as basic collection

And also supports one-to-many etc… as association collections.

Here list and Map are index based collection where set in non-index based collection.

For collection field a new table will be created to store data as supperate entity, and this data will be linked as FK.Pk data.

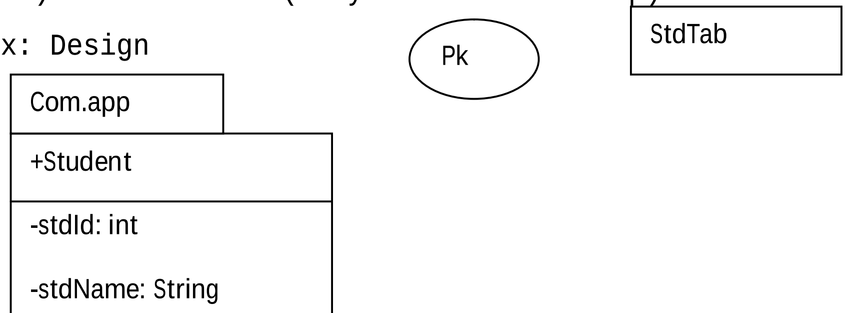
Every collection table must contain:

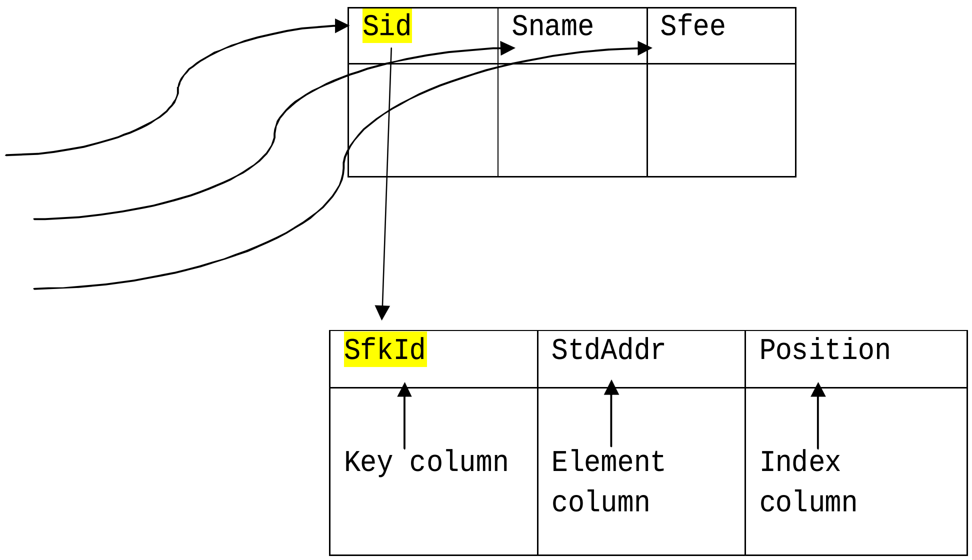
I) Key Column

II) Element column with type

III) Index column (only for List and Map)

Ex: Design





Coding:

```
XML Mapping Code (student.hbm.xml):
<hibernate-mapping package=”com.app”>
<class name=”Studen” table=”stdtab”>
<id name=”stdId” column=”sid”>
<!--<generator class=”increment”/>-->
</id>
<property name=”stdName” column=”sname”/>
<property name=”stdFee” column=”sfee”/>
<list name=”stdAddr” table=”stdaddrtab”>
      <key column=”sfkId”/>
      <index column=”posion”/>
      <element column=”addrdata” type=”String”/>
</list> </class> </hibernate-mapping>
```

Main code:

```
Tx=ses.beginTransaction();
Tx.begin();
List<String> listAddr=new ArrayList<String>();
listAddr.add(“Address 101-1”);
```

```
    listAddr.add(“Address 101-2”);
    listAddr.add(“Address 101-3”);
    Student stdObj=new Student();
    stdObj.setStdId(103);
    stdObj.setStdName(“SAJ”);
    stdObj.setStdFee(3546.23);
    stdObj.setAddr(listAddr);
    ses.save(stdObj);
```

Map Collection: Map Collection takes 3 inputs

I)Key Column (as Fk, refers Pk in parent)
II)Index column (key from Map)
III)element column (value from Map)

```
    Ex: package com.app;
        Public class Student {
        Private int stdId;
        Private String stdName;
        Private double stdFee;
        Private Map<String,String> addrMap;
        //setters and getters
        //toString methods
        }
```

Student.hbm.xml:

```
<hibernate-mapping package=”com.app”>
    <class name=”Studen” table=”stdtab”>
    <id name=”stdId” column=”sid”/>
    <property name=”stdName” column=”sname”/>
    <property name=”stdFee” column=”sfee”/>
    <map name=”addrMap” table=”stdaddrtab”>
        <key column=”sfkId”/>
```

```
          <index column=”mapkey”/>
          <element column=”mapval” type=”String”/>
     </map> </class> </hibernate-mapping>
```

Main Code:

```
     //configuration
     // sessionfactory, session, transaction
     //operation
     Map<string,string>   mapAddr=new  HashMap<String,String>();
     mapAddr.put(“key-addr1”,”val-addr1”);
     mapAddr.put(“key-addr2”,”val-addr2”);
     mapAddr.put(“key-addr3”,”val-addr3”);
     Student stdObj=new Student();
     stdObj.setstdId(103);
     stdObj.setstdName(“SAH”);
     stdObj.setstdFee(2435.24);
     stdObj.setstdAddr(mapAddr);
     ses.save(stdObj);
```

Note: Map Data will be stored in child table as

Map key will be stored in → Index Column

Map value will be stored in → element column

Hibernate Collections Mapping:

Hibernate supports all basic collection mapping, that stores as new table. Basic collections are divided into two types.

1. Index based: List, Map.
2. Non-Index based: Set.

Every collection-mapping table must contains

Key column - (refers primary key of parent)

Element column – (represent data/map value)

And index based collection contains

Index column – (represents position/map key)

Note:

1. In case of list index type is int so not required to specify any type for index and need to specify type of only element.
2. In case of map type is required to specify for both index column (map key) and element column (map value)
3. Set never contains index. So, type is required only for element column.
4. For ever child table providing name is optional hibernate by default consider parent table name_variable name as table name, to specify our own table name use table attribute as collection tag level.

```
package com.app;
import java.util.List;
public class Student {
      private int stdId;
      private String stdName;
      private double stdFee;
      private List<String> stdAddr;
      public Student() {
            super();
      }
      public Student(int stdId, String stdName, double stdFee,
                  List<String> stdAddr) {
            super();
            this.stdId = stdId;
            this.stdName = stdName;
            this.stdFee = stdFee;
            this.stdAddr = stdAddr;
      }
      public int getStdId() {
            return stdId;
```

```java
    }
    public void setStdId(int stdId) {
        this.stdId = stdId;
    }
    public String getStdName() {
        return stdName;
    }
    public void setStdName(String stdName) {
        this.stdName = stdName;
    }
    public double getStdFee() {
        return stdFee;
    }
    public void setStdFee(double stdFee) {
        this.stdFee = stdFee;
    }
    public List<String> getStdAddr() {
        return stdAddr;
    }
    public void setStdAddr(List<String> stdAddr) {
        this.stdAddr = stdAddr;
    }
    @Override
    public String toString() {
        return "Employee [stdId=" + stdId + ", stdName=" + stdName
                + ", stdFee=" + stdFee + ", stdAddr=" + stdAddr + "]";
    }
}
```

```xml
<?xml version="1.0" encoding="UTF-8"?>

<!DOCTYPE hibernate-configuration PUBLIC
```

```
     "-//Hibernate/Hibernate Configuration DTD 3.0//EN"
     "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">

        <hibernate-configuration>
        <session-factory>
        <property
name="connection.driver_class">oracle.jdbc.driver.OracleDriver</property>
        <property
name="connection.url">jdbc:oracle:thin:@localhost:1521:XE</property>
        <property name="connection.username">system</property>
        <property name="connection.password">system</property>
        <property
name="dialect">org.hibernate.dialect.OracleDialect</property>
        <property name="show_sql">true</property>
        <property name="format_sql">true</property>
        <property name="hbm2ddl.auto">create</property>

        <mapping resource = "student.hbm.xml"/>
        </session-factory>
        </hibernate-configuration>
```

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE hibernate-mapping PUBLIC
    "-//Hibernate/Hibernate Mapping DTD 3.0//EN"
    "http://hibernate.sourceforge.net/hibernate-mapping-3.0.dtd">
   <hibernate-mapping package="com.app">
     <class name="Student" table="stdtab1">
           <id name="stdId" column="sid"/>
           <property name="stdName" column="sname" />
           <property name="stdFee" column="sfee" />
           <list name="stdAddr" table="stdaddr">
```

```
                <key column="sfkId"/>
                <index column="pos"/>
                <element column="addrdata" type="string"/>
           </list>
      </class>
</hibernate-mapping>

package com.app;
import java.util.ArrayList;
import java.util.List;
import org.hibernate.Session;
import org.hibernate.SessionFactory;
import org.hibernate.Transaction;
import org.hibernate.cfg.Configuration;

public class Main {
public static void main(String[] args) {
           Configuration cfg=new Configuration().configure();
           SessionFactory sf=cfg.buildSessionFactory();
           Session session=sf.openSession();
           Transaction tx=session.beginTransaction();
           tx.begin();
           Student std=new Student();
           std.setStdId(101);
           std.setStdName("Venu");
           std.setStdFee(3000);
           List<String> list=new ArrayList<String>();
           list.add("Bangalore");
           list.add("Hyderabad");
           list.add("Kurnool");
           list.add("Mysore");
           std.setStdAddr(list);
```

```
          session.save(std);
          tx.commit();
          session.close();
          System.out.println("Record update successfully");
     }  }
```

```
OUTPUT:         SID  SNAME  SFEE
                                  SFKID   ADDRDATA  POS
                101   Venu  3000
                                    101  Bangalore    0
                                    101  Hyderabad    1
                                    101  Kurnool      2
                                    101  Mysore       3
```

****Bag Collection (Hibernate specific):** A Bag is collection of items which can even store duplicate items.

A bag is list type implementation where list maintains index at table level and bag will not maintain any index.

Bag is most performance effective than all collections.

Map is slower than all collection (configuration and reading).

EX:

```
package com.app;
Public class Student {
Private int stdId;
Private String stdName;
Private double stdFee;
Private List<String > addrList;
//setters and getters
//toString methods
}
```

Student.hbm.xml:

```
<hibernate-mapping package=”com.app”>
     <class name=”Studen” table=”stdtab”>
     <id name=”stdId” column=”sid”/>
```

```
    <property name=”stdName” column=”sname”/>
    <property name=”stdFee” column=”sfee”/>
    <bag name=”addrList” table=”stdaddrtab”>
         <key column=”sfkId”/>
         <element column=”value” type=”String”/>
    </bag> </class> </hibernate-mapping>
```

Main Code:

```
    //configuration
    // sessionfactory, session, transaction
    //operation
    List<string>   ListAddr=new  ArrayList<String>();
    ListAddr.add(“Addr1”);
    ListAddr.add(“Addr2”);
    ListAddr.add(“Addr3”);
    Student stdObj=new Student();
    stdObj.setstdId(103);
    stdObj.setstdName(“SAH”);
    stdObj.setstdFee(2435.24);
    stdObj.setstdAddr(listAddr);
    ses.save(stdObj);
```

Inheritance Mapping: Model classes can follow inheritance method, for this table can be created in below ways.

I) Table per class

II) Table per Concret class

III) Table per subclass

I) **Table per class:** It create single table per complete hierarchy. It binds all columns into single table with extra column know as discriminator.

For this we have to specify discriminator-value at class level to identify what type of record created in DB.

For Example:

Design:

To represent parent class in mapping code we have to specify <class> tag.

To represent child class we have to specify <subclass> tag.

Java Code:

```
I.    Public class Employee {
      Private int empId;
      Private String empName;
      ….}
II.   Public class Manager extends Employee {
      Private String projStatus;
      Private String version;
      ….}
III.  Public class Developer extends Employee     {
      Private String tech;
      Private String tools;
      ….}
```

Employee.hbm.xml:

```
      <class name="Employee" table="emptab" discriminator-value="0">
      <id name="empId" column="eid"/>
      <discriminator column="format" type="String"/>
      <property name="empName" column="ename"/>
      <subclass name="Manager" discriminator-value="1">
            <property name="projstatus" column="pstatus"/>
            <property name="version" column="version"/>
      </subclass>
      <subclass name="Developer" discriminator-value="2">
            <property name="tech" column="tech"/>
            <property name="tools" column="tools"/>
      </subclass>
</class>
```

Main Code:

```
//configuration
// sessionfactory, session, transaction
//operation
//Employee Object
Employee emp=new Employee();
emp.setEmpId(101);
emp.setEmpName(“A”);
//Manager Object
Manager mgr=new Manager();
mgr.setEmpId(102);
mgr.setEmpName(“B”);
mgr.setProjStatus(“RSL”);
mgr.setVersion(“1.2”);
//Developer Object
Developer  dev=new Developer();
dev.setEmpId(103);
dev.setEmpName(“C”);
dev.setTech(“Java”);
dev.setTools(“Eclipse,Ant”);
ses.save(emp);
ses.save(mgr);
ses.save(dev);
tx.commit();
```

Pagination Logic:

```
Inputs: PageNumber
           PageSize
           Recordcount
Totalpages=(recordscount/pageSize)+((recordCount%PageSize>)0?1:0)
Emplist=Session.createCriteria(Employee.class).setFirstResult((pageNumb
er-1)*pageSize).setMaxResult(pagesize).list());
```

Hibernate-joins:

Hibernate supports 4 types of joins

1. Inner join or join
2. Left Outer join (or) left join
3. Right outer join (or) right join
4. Full outer join (or) full join

1. Inner join or join:

UML for classes: for example, consider two classes which are having mapping relation (like one-to-many etc….) for those, to read data from specific column then joins are used.

Joins only used to read data by making connection between 2 tables.

```
Classes: public class com.app.Employee{
     Private int empId;
     Private String empName;
     Private double empSal;
     Private Set<Address> addrSet;
     … //setter and getters
     }

     Public class Address {
     Private int addrId;
     Private String location;
     Private String hno;
     …//setters and getters
     }
```

And Consider same data under the tables as below,

EID	ENNAME	ESAL
101	Abcd	256.36
102	MNOP	156.36

103	IJKL	456.36
104	xyz	856.36

AID	LOC	HNO	EFKID
10	HYD	1-21	101
11	HYD1	1-213	101
12	BAN	1-21	102
13	MNO	996-6	NULL
14	PQR	12/85	NULL

Query for Inner join/join

Select emp.empId, emp.empName, addr.location, addr.hno from com.app.Employee as emp

Join emp.addrSet as addr.

Note: To join two classes / tables use join field in the parent class and use alias name to specify the join of child.

Ex: from <parentclass> as <alias-name1>

<join-type>

<alias-names> <join-field as <alias-name>>

Here alias-name1 indicates parent class and alias-name2 indicates child classes.

For above Query, data is:

```
101   abcd       256.36     10    hyd   1-21
101   abcd       256.36     11    hyd1   1-213
102   MNop       156.36     12    BAN   1-21
```

```
101   abcd       hyd   1-21
101   abcd       hyd1  1-213
102   MNOP       BAN   1-21
```

Left Join:

Query: select emp.empId, addr.location from com.app.Employee as emp left outer join emp.addrSet as addr

Data:

101	hyd
101	hyd1
102	BAN
103	Null
104	Null

Right Join:

Query: select emp.empId, addr.location from com.app.Employee as emp right join emp.addrSet as addr

Data:

101	10	hyd
101	11	hyd1
102	12	BAN
Null	13	MNO
Null	14	PQR

Cache Concept in Hibernate:

It a method of main ting (temporary memory at application level).

Cache types:

1. First Level (session cache)
2. Second Level (session Factory cache)

1. **First Level:** session cache maintained is taken care by hibernate only. As programmer we can not disable (or) enable this cache.

   Once Session close and opened data will be loaded database only.

2. **Session Factory cache:** Instead going to data base every time, we can create a temporary memory at application side (which can be enabled and disabled by programmer) to store data for some time.

Annotation in Hibernate: To specify configuration at java code (Model class level) 2 required annotations are need to be applied they are:

@ Entity indicates class

@ Id primary key column

To specify the column names and tables names use

```
@ Table (name = “  “)
@ Column (name=”  “)
```

To configuration this class in cfg files use below:

```
SYN: <mapping class=”   “/>
Ex:  <mapping class=”com.app.Employee”/>
```

Session Factory as Singleton Object: For every Application we maintain SF as single object. To convert SF as Singleton, we use singleton Design pattern. as below format.

Format 1:

Using Static Block: Static block will be executed only once, at the time loading the class into JVM, or on server Startup.

```
Public class HibernateUtill {
Private static SessionFactory factory=null;
Static     {
Configuration cfg=new configuration().configure();
Factory=cfg.buildSessionFactory();
}
Public static Session getSessionFactoryObject()  {
Return factory;
}
```

Format 2: /** code as static method explicit call **/

```
Public class HibernateUtill {
Private static SessionFactory factory=null;
Public Static   sessionfactory getSessionFactoryObject(){
If(factory==null)
{
Configuration cfg=new configuration().configure();
Factory=cfg.buildSessionFactory();
}
```

```
    Return factory;

    }

    }
```

Format 3: /** code as static method implicit call**/

```
    Public class HibernateUtill {

    Private static SessionFactory factory=null;

    Public Static   sessionfactory assignFirstValue(){

    Return new  configuration().configure().buildSessionFactory();

    }

    Public static Session getSessionFactoryObject()  {

    Return factory;

    }
```

Sample Programs

```
package com.app;

public class Account {
    private int accNum;
    private String name;
    private double balance;
    public int getAccNum() {
        return accNum;
    }
    public void setAccNum(int accNum) {
        this.accNum = accNum;
    }
    public String getName() {
        return name;
    }
    public void setName(String name) {
        this.name = name;
    }
    public double getBalance() {
        return balance;
    }
    public void setBalance(double balance) {
          this.balance = balance;
     }
     @Override
     public String toString() {
          return "Account [accNum=" + accNum + ", name=" + name + ",
balance="
                    + balance + "]";
     }


}
```

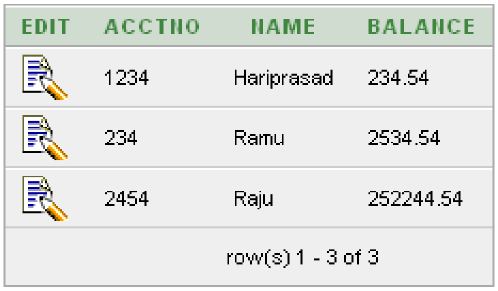
```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE hibernate-configuration PUBLIC
     "-//Hibernate/Hibernate Configuration DTD 3.0//EN"
     "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">

        <hibernate-configuration>
        <session-factory>
        <property
name="connection.driver_class">oracle.jdbc.driver.OracleDriver</property>
        <property
name="connection.url">jdbc:oracle:thin:@localhost:1521:XE</property>
        <property name="connection.username">system</property>
        <property name="connection.password">system</property>
        <property
name="dialect">org.hibernate.dialect.OracleDialect</property>
        <property name="show_sql">true</property>
        <property name="format_sql">true</property>
        <property name="hbm2ddl.auto">update</property>

        <mapping resource = "account.hbm.xml"/>
        </session-factory>
        </hibernate-configuration>
```

```
<?xml version="1.0" encoding="UTF-8"?>

<!DOCTYPE hibernate-mapping PUBLIC
    "-//Hibernate/Hibernate Mapping DTD 3.0//EN"
    "http://www.hibernate.org/dtd/hibernate-mapping-3.0.dtd">
   <hibernate-mapping package="com.app">
  <class name="Account" table="accounttab">
           <id name="accNum" column="acctno"/>
           <property name="name" column="Name"/>
           <property name="balance" column="Balance"/>
     </class>
  </hibernate-mapping>
```

```
package com.app;
import org.hibernate.cfg.Configuration;
import org.hibernate.SessionFactory;
import org.hibernate.Session;
import org.hibernate.Transaction;
public class Test {
      public static void main(String[] args) {
      Configuration cfg=new Configuration();
      cfg.configure("hibernate.cfg.xml");
      SessionFactory factory=cfg.buildSessionFactory();
      Session session=factory.openSession();
      Transaction tx=session.beginTransaction();
      tx.begin();
      Account stu = new Account();
      stu.setAccNum(2454);
      stu.setBalance(252244.54);
      stu.setName("Raju");;
      session.save(stu);
      tx.commit();
      session.close();
      System.out.println(stu);
      System.out.println("done");


      session.close();
      }

      }
```

```
SLF4J: Failed to load class "org.slf4j.impl.StaticLoggerBinder".
SLF4J: Defaulting to no-operation (NOP) logger implementation
SLF4J: See http://www.slf4j.org/codes.html#StaticLoggerBinder for further
details.
Hibernate:
    insert
    into
        accounttab
        (Name, Balance, acctno)
    values
        (?, ?, ?)
Account [accNum=2454, name=Raju, balance=252244.54]
done
Exception in thread "main" org.hibernate.SessionException: Session was
already closed
      at org.hibernate.impl.SessionImpl.close(SessionImpl.java:320)
      at com.app.Test.main(Test.java:25)
```

http://127.0.0.1:8080/apex/f?p=4500:1001:2475510258818860::NO:::



EDIT	ACCTNO	NAME	BALANCE
✎	1234	Hariprasad	234.54
✎	234	Ramu	2534.54
✎	2454	Raju	252244.54

row(s) 1 - 3 of 3

Hibernate Collections

http://127.0.0.1:8080/apex/f?p=4500:1001:1583328310102601::NO:::

```
package com.app;

import java.util.List;

public class Student {
      private int stdId;
      private String stdName;
      private double stdFee;
      private List<String> stdAddr;
      public Student() {
          super();
      }
      public Student(int stdId, String stdName, double stdFee,
                  List<String> stdAddr) {
          super();
          this.stdId = stdId;
          this.stdName = stdName;
          this.stdFee = stdFee;
          this.stdAddr = stdAddr;
      }
      public int getStdId() {
          return stdId;
      }
      public void setStdId(int stdId) {
          this.stdId = stdId;
      }
      public String getStdName() {
          return stdName;
      }
      public void setStdName(String stdName) {
          this.stdName = stdName;
      }
      public double getStdFee() {
          return stdFee;
      }
      public void setStdFee(double stdFee) {
          this.stdFee = stdFee;
      }
      public List<String> getStdAddr() {
          return stdAddr;
      }
      public void setStdAddr(List<String> stdAddr) {
          this.stdAddr = stdAddr;
      }
      @Override
      public String toString() {
          return "Employee [stdId=" + stdId + ", stdName=" + stdName
                      + ", stdFee=" + stdFee + ", stdAddr=" + stdAddr + "]";
      }
 }
```

```
<?xml version="1.0" encoding="UTF-8"?>


<!DOCTYPE hibernate-configuration PUBLIC
     "-//Hibernate/Hibernate Configuration DTD 3.0//EN"
     "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">
         <hibernate-configuration>
        <session-factory>
        <property 
name="connection.driver_class">oracle.jdbc.driver.OracleDriver</property>
        <property 
name="connection.url">jdbc:oracle:thin:@localhost:1521:XE</property>
        <property name="connection.username">system</property>
        <property name="connection.password">system</property>
        <property 
name="dialect">org.hibernate.dialect.OracleDialect</property>
        <property name="show_sql">true</property>
        <property name="format_sql">true</property>
        <property name="hbm2ddl.auto">create</property>

        <mapping resource = "student.hbm.xml"/>
        </session-factory>
        </hibernate-configuration>
```

```
<?xml version="1.0" encoding="UTF-8"?>
```

```
<!DOCTYPE hibernate-mapping PUBLIC
    "-//Hibernate/Hibernate Mapping DTD 3.0//EN"
    "http://hibernate.sourceforge.net/hibernate-mapping-3.0.dtd">
   <hibernate-mapping package="com.app">
     <class name="Student" table="stdtab1">
           <id name="stdId" column="sid"/>
           <property name="stdName" column="sname" />
           <property name="stdFee" column="sfee" />
           <list name="stdAddr" table="stdaddr">
                <key column="sfkId"/>
                <index column="pos"/>
                <element column="addrdata" type="string"/>
           </list>

     </class>
</hibernate-mapping>
```

```
package com.app;

import java.util.ArrayList;
import java.util.List;

import org.hibernate.Session;
import org.hibernate.SessionFactory;
import org.hibernate.Transaction;
import org.hibernate.cfg.Configuration;

public class Main {

public static void main(String[] args) {
```

```
            Configuration cfg=new Configuration().configure();
            SessionFactory sf=cfg.buildSessionFactory();
            Session session=sf.openSession();
            Transaction tx=session.beginTransaction();
            tx.begin();
            Student std=new Student();
            std.setStdId(101);
            std.setStdName("Venu");
            std.setStdFee(3000);
            List<String> list=new ArrayList<String>();
            list.add("Bangalore");
            list.add("Hyderabad");
            list.add("Kurnool");
            list.add("Mysore");
            std.setStdAddr(list);

            session.save(std);

            tx.commit();

            session.close();
            System.out.println("Record update successfully");

      }
}
OutPut:
      SID   SNAME SFEE
      101   Venu  3000
            row(s) 1 - 1 of 1

      SFKID ADDRDATA   POS
      101   Bangalore       0
```

```
    101   Hyderabad  1
    101   Kurnool         2
    101   Mysore          3
          row(s) 1 - 4 of 4
```

```java
package com.app;

import java.util.List;

public class StudentDetails {
    private int stdId;
    private String stdName;
    private double stdFee;
    private List<Integer> stdMarks;
    public StudentDetails() {
        super();
    }
    public StudentDetails(int stdId, String stdName, double stdFee,
            List<Integer> stdMarks) {
        super();
        this.stdId = stdId;
        this.stdName = stdName;
        this.stdFee = stdFee;
        this.stdMarks = stdMarks;
    }
    public int getStdId() {
        return stdId;
    }
    public void setStdId(int stdId) {
        this.stdId = stdId;
    }
```

```java
     public String getStdName() {
          return stdName;
     }
     public void setStdName(String stdName) {
          this.stdName = stdName;
     }
     public double getStdFee() {
          return stdFee;
     }
     public void setStdFee(double stdFee) {
          this.stdFee = stdFee;
     }
     public List<Integer> getStdMarks() {
          return stdMarks;
     }
     public void setStdMarks(List<Integer> stdMarks) {
          this.stdMarks = stdMarks;
     }
     @Override
     public String toString() {
          return "StudentDetails [stdId=" + stdId + ", stdName=" + stdName
                    + ", stdFee=" + stdFee + ", stdMarks=" + stdMarks +
"]";
     }
}
```

```xml
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE hibernate-mapping PUBLIC
    "-//Hibernate/Hibernate Mapping DTD 3.0//EN"
    "http://hibernate.sourceforge.net/hibernate-mapping-3.0.dtd">
    <hibernate-mapping>
    <class name="com.app.StudentDetails"    table="stdTab">
    <id name="stdId" column="sid"/>
    <property name="stdName" column="sname"/>
    <property name="stdFee"  column="sfee"/>
    <list name="stdMarks" table="stdmarks">
    <key column="sidfk"/>
    <index column="No"/>
    <element column="Marks" type="int"/>
    </list>

    </class>
    </hibernate-mapping>
```

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE hibernate-configuration PUBLIC
        "-//Hibernate/Hibernate Configuration DTD 3.0//EN"
        "http://hibernate.sourceforge.net/hibernate-configuration-3.0.dtd">

 <hibernate-configuration>
        <session-factory>
        <property name="hibernate.connection.driver_class">oracle.jdbc.driver.OracleDriver</property>
        <property name="hibernate.connection.url">jdbc:oracle:thin:@localhost:1521:XE</property>
        <property name="hibernate.connection.username">system</property>
        <property name="hibernate.connection.password">system</property>
        <property name="hibernate.dialect">org.hibernate.dialect.OracleDialect</property>
        <property name="show_sql">true</property>
        <property name="format_sql">true</property>
        <property name="hbm2ddl.auto">create</property>
```

```xml
        <mapping resource = "employee.hbm.xml"/>
        </session-factory>
        </hibernate-configuration>
```

```java
package com.app;
import java.util.ArrayList;
import java.util.List;

import org.hibernate.Session;
import org.hibernate.SessionFactory;
import org.hibernate.Transaction;
import org.hibernate.cfg.Configuration;


public class Main {
           public static void main (String[] arg){
           Configuration cfg=new Configuration().configure();
           SessionFactory sf=cfg.buildSessionFactory();
           Session ses=sf.openSession();
           Transaction tx=ses.beginTransaction();
           tx.begin();

           List<Integer>   stdlist=new ArrayList<Integer>();
           stdlist.add(75);
           stdlist.add(79);
           stdlist.add(85);
           stdlist.add(56);
           StudentDetails  std=new StudentDetails();
           std.setStdId(20);
           std.setStdName("Sivakumar");
           std.setStdFee(3000);
           std.setStdMarks(stdlist);

           ses.save(std);
           tx.commit();
           ses.close();

           }

}
```

```
SLF4J: Failed to load class "org.slf4j.impl.StaticLoggerBinder".
SLF4J: Defaulting to no-operation (NOP) logger implementation
SLF4J: See http://www.slf4j.org/codes.html#StaticLoggerBinder for further details.
Hibernate:
    insert into stdTab(sname, sfee, sid) values(?, ?, ?)
Hibernate:
    insert into stdmark(sidfk, No, Marks) values(?, ?, ?)
Hibernate:
    insert into stdmarks(sidfk, No, Marks) values(?, ?, ?)
Hibernate:
    insert into stdmarks(sidfk, No, Marks) values(?, ?, ?)
Hibernate:
    insert into stdmarks(sidfk, No, Marks) values(?, ?, ?)
```

StdTab

```
           SID  SNAME      SFEE
           20   Sivakumar       3000
           row(s) 1 - 1 of 1
```

stdMarks

```
     Insert Row

EDIT SIDFK MARKS NO
Edit 20    75    0
Edit 20    79    1
Edit 20    85    2
Edit 20    56    3
```

This program collections (List,Set,Map)

```
package com.app;

import java.util.List;
import java.util.Map;
import java.util.Set;

public class Employee {
     private int empId;
     private String empName;
     private double empSal;
     private List<String> empProj;
     private Set<String>   sampleOne;
     private Map<String,String> sampleTwo;
```

```
public Employee() {
    super();
}
public Employee(int empId, String empName, double empSal,
        List<String> empProj, Set<String> sampleOne,
        Map<String, String> sampleTwo) {
    super();
    this.empId = empId;
    this.empName = empName;
    this.empSal = empSal;
    this.empProj = empProj;
    this.sampleOne = sampleOne;
    this.sampleTwo = sampleTwo;
}
public int getEmpId() {
    return empId;
}
public void setEmpId(int empId) {
    this.empId = empId;
}
public String getEmpName() {
    return empName;
}
public void setEmpName(String empName) {
    this.empName = empName;
}
public double getEmpSal() {
    return empSal;
}
public void setEmpSal(double empSal) {
    this.empSal = empSal;
}
```

```
    public List<String> getEmpProj() {
        return empProj;
    }
    public void setEmpProj(List<String> empProj) {
        this.empProj = empProj;
    }
    public Set<String> getSampleOne() {
        return sampleOne;
    }
    public void setSampleOne(Set<String> sampleOne) {
        this.sampleOne = sampleOne;
    }
    public Map<String, String> getSampleTwo() {
        return sampleTwo;
    }
    public void setSampleTwo(Map<String, String> sampleTwo) {
        this.sampleTwo = sampleTwo;
    }
    @Override
    public String toString() {
        return "Employee [empId=" + empId + ", empName=" + empName
                + ", empSal=" + empSal + ", empProj=" + empProj
                + ", sampleOne=" + sampleOne + ", sampleTwo=" +
sampleTwo + "]";
    }
}
```

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE hibernate-configuration PUBLIC
        "-//Hibernate/Hibernate Configuration DTD 3.0//EN"
        "http://hibernate.sourceforge.net/hibernate-configuration-3.0.dtd">

 <hibernate-configuration>
        <session-factory>
        <property name="hibernate.connection.driver_class">oracle.jdbc.driver.OracleDriver</property>
        <property name="hibernate.connection.url">jdbc:oracle:thin:@localhost:1521:XE</property>
        <property name="hibernate.connection.username">system</property>
        <property name="hibernate.connection.password">system</property>
        <property name="hibernate.dialect">org.hibernate.dialect.OracleDialect</property>
        <property name="show_sql">true</property>
        <property name="format_sql">true</property>
        <property name="hbm2ddl.auto">create</property>

        <mapping resource = "employee.hbm.xml"/>
        </session-factory>
        </hibernate-configuration>
```

```
<?xml version="1.0" encoding="UTF-8"?>

<!DOCTYPE hibernate-mapping PUBLIC
    "-//Hibernate/Hibernate Mapping DTD 3.0//EN"
    "http://hibernate.sourceforge.net/hibernate-mapping-3.0.dtd">
    <hibernate-mapping>
    <class name="com.app.Employee"    table="empTab11">
    <id name="empId" column="eid"/>
    <property name="empName" column="ename"/>
    <property name="empSal"  column="esal"/>
    <list name="empProj" table="empproject">
    <key column="eidfk"/>
    <index column="position"/>
    <element column="data" type="string"/>
    </list>

    <set name="sampleOne" table="samOne">
    <key column="eidfk" />
    <element column="data" type="string"/>
    </set>

    <map name="sampleTwo" table="samTwo">
    <key column="eidfk"/>
    <index column="position" type="string"/>
    <element column="data" type="string"/>
    </map>



    </class>
    </hibernate-mapping>
```

```
package com.app;
import java.util.ArrayList;
import java.util.HashMap;
import java.util.HashSet;
import java.util.List;
import java.util.Map;
import java.util.Set;

import org.hibernate.Session;
import org.hibernate.SessionFactory;
import org.hibernate.Transaction;
import org.hibernate.cfg.Configuration;



public class Main {
           public static void main (String[] arg){
           Configuration cfg=new Configuration().configure();
           SessionFactory sf=cfg.buildSessionFactory();
           Session ses=sf.openSession();
           Transaction tx=ses.beginTransaction();
           tx.begin();

           List<String>    emplist=new ArrayList<String>();
           emplist.add("asdf");
           emplist.add("mnop");
           emplist.add("ghij");
           emplist.add("pqrst");

           Set<String>     empset=new HashSet<String>();
           empset.add("A");
           empset.add("B");
           empset.add("C");
           empset.add("D");

           Map<String,String> empmap=new HashMap<String,String>();
           empmap.put("k1", "v1");
           empmap.put("k2", "v2");
           empmap.put("k3", "v3");
           empmap.put("k4", "v4");

           Employee emp=new Employee();
           emp.setEmpId(101);
```

```
        emp.setEmpName("Ramesh");
        emp.setEmpSal(34555.00);

        emp.setEmpProj(emplist);
        emp.setSampleOne(empset);
        emp.setSampleTwo(empmap);

        ses.save(emp);
        tx.commit();
        ses.close();

        }

}
```

Output:

```
SLF4J: Failed to load class "org.slf4j.impl.StaticLoggerBinder".
SLF4J: Defaulting to no-operation (NOP) logger implementation
SLF4J: See http://www.slf4j.org/codes.html#StaticLoggerBinder for further details.
Hibernate: insert into empTab11(ename, esal, eid) values(?, ?, ?)
Hibernate: insert into empproject(eidfk, position, data) values(?, ?, ?)
Hibernate: insert into empproject(eidfk, position, data) values(?, ?, ?)
Hibernate: insert into empproject(eidfk, position, data) values(?, ?, ?)
Hibernate: insert into empproject(eidfk, position, data) values(?, ?, ?)
Hibernate: insert into samOne(eidfk, data) values(?, ?)
Hibernate: insert into samOne(eidfk, data) values(?, ?)
Hibernate: insert into samOne(eidfk, data) values(?, ?)
Hibernate: insert into samOne(eidfk, data) values(?, ?)
Hibernate: insert into samTwo(eidfk, position, data) values(?, ?, ?)
```

```
Hibernate: insert into samTwo(eidfk, position, data) values(?, ?, ?)
Hibernate: insert into samTwo(eidfk, position, data) values(?, ?, ?)
Hibernate: insert into samTwo(eidfk, position, data) values(?, ?, ?)
```

EmpTab11

EID	ENAME	ESAL
101	Ramesh	34555

EmpProject

EIDFK	DATA	POSITION
101	asdf	0
101	mnop	1
101	ghij	2
101	pqrst	3

samOne

EIDFK	DATA
101	D
101	A
101	B
101	C

samTo

EIDFK	DATA	POSITION
101	v3	k3
101	v4	k4
101	v1	k1
101	v2	k2

```
===========================================================================
===========================

package com.app;

import java.util.List;
import java.util.Set;

public class Product {
    private int prdId;
    private List<String> parts;
    private Set<String> buildItems;
    private List<Integer> content;
    public Product() {
        super();
    }
    public Product(int prdId, List<String> parts, Set<String> buildItems,
            List<Integer> content) {
        super();
        this.prdId = prdId;
        this.parts = parts;
        this.buildItems = buildItems;
        this.content = content;
    }
    public int getPrdId() {
        return prdId;
    }
    public void setPrdId(int prdId) {
        this.prdId = prdId;
    }
    public List<String> getParts() {
```

```java
        return parts;
    }
    public void setParts(List<String> parts) {
        this.parts = parts;
    }
    public Set<String> getBuildItems() {
        return buildItems;
    }
    public void setBuildItems(Set<String> buildItems) {
        this.buildItems = buildItems;
    }
    public List<Integer> getContent() {
        return content;
    }
    public void setContent(List<Integer> content) {
        this.content = content;
    }
    @Override
    public String toString() {
        return "Product [prdId=" + prdId + ", parts=" + parts + ", 
buildItems="
                + buildItems + ", content=" + content + "]";
    }
}
```

```xml
<?xml version="1.0" encoding="UTF-8"?>

<!DOCTYPE hibernate-configuration PUBLIC
    "-//Hibernate/Hibernate Configuration DTD 3.0//EN"
    "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">
```

```
        <hibernate-configuration>
        <session-factory>
        <property
name="connection.driver_class">oracle.jdbc.driver.OracleDriver</property>
        <property
name="connection.url">jdbc:oracle:thin:@localhost:1521:XE</property>
        <property name="connection.username">system</property>
        <property name="connection.password">system</property>
        <property
name="dialect">org.hibernate.dialect.OracleDialect</property>
        <property name="show_sql">true</property>
        <property name="format_sql">true</property>
        <property name="hbm2ddl.auto">create</property>

        <mapping resource = "product.hbm.xml"/>
        </session-factory>
        </hibernate-configuration>
<?xml version="1.0" encoding="UTF-8"?>



<!DOCTYPE hibernate-mapping PUBLIC
    "-//Hibernate/Hibernate Mapping DTD 3.0//EN"
    "http://hibernate.sourceforge.net/hibernate-mapping-3.0.dtd">
   <hibernate-mapping package="com.app">
     <class name="Product" table="productTab">
           <id name="prdId" column="pid"/>
           <list name="parts" table="partsTab">
                <key column="pidfk"/>
                <index column="pos"/>
                <element column="parts" type="string"/>

           </list>
           <set name="buildItems" table="buildTab">
           <key column="pidfk"/>
           <element column="buildItems" type="string"/>

           </set>

           <list name="content" table="contenTab">
           <key column="pidfk"/>
                <index column="pos"/>
                <element column="content" type="int"/>

           </list>

     </class>
</hibernate-mapping>
```

```
package com.app;
import java.util.ArrayList;
import java.util.HashSet;
import java.util.List;
import java.util.Set;

import org.hibernate.Session;
import org.hibernate.SessionFactory;
import org.hibernate.Transaction;
import org.hibernate.cfg.Configuration;

public class Main {
    public static void main(String[] args) {
        Configuration cfg=new Configuration().configure();
        SessionFactory sf=cfg.buildSessionFactory();
        Session session=sf.openSession();
        Transaction tx=session.beginTransaction();
        tx.begin();
        Product p=new Product();
        p.setPrdId(100);

        List<String> list=new ArrayList<String>();
        list.add("adf");
        list.add("hjkl");
        list.add("mnop");
        p.setParts(list);

        Set<String> bn=new HashSet<String>();
        bn.add("M");
        bn.add("N");
        bn.add("O");
        p.setBuildItems(bn);

        List<Integer> list1=new ArrayList<Integer>();
        list1.add(20);
        list1.add(2);
        list1.add(89);
        p.setContent(list1);
        session.save(p);
        tx.commit();
        session.close();
        System.out.println("successfully");

    }
}
```

```
SLF4J: Failed to load class "org.slf4j.impl.StaticLoggerBinder".
SLF4J: Defaulting to no-operation (NOP) logger implementation
```

```
SLF4J: See http://www.slf4j.org/codes.html#StaticLoggerBinder for further
details.
Hibernate: insert into productTab(pid) values(?)
Hibernate: insert into partsTab(pidfk, pos, parts) values(?, ?, ?)
Hibernate: insert into partsTab(pidfk, pos, parts) values(?, ?, ?)
Hibernate: insert into partsTab(pidfk, pos, parts) values(?, ?, ?)
Hibernate: insert into buildTab(pidfk, buildItems) values(?, ?)
Hibernate: insert into buildTab(pidfk, buildItems) values(?, ?)
Hibernate: insert into buildTab(pidfk, buildItems) values(?, ?)
Hibernate: insert into contenTab(pidfk, pos, content) values(?, ?, ?)
Hibernate: insert into contenTab(pidfk, pos, content) values(?, ?, ?)
Hibernate: insert into contenTab(pidfk, pos, content) values (?, ?, ?)
successfully
PRODUCTTAB
     PID
     100
PARTSTAB
     PIDFK PARTS POS
     100   adf   0
     100   hjkl  1
     100   mnop  2

BUILDTAB
     PIDFK BUILDITEMS
     100   M
     100   N
     100   O

CONTENTTAB
     PIDFK CONTENT    POS
     100   20         0
     100   2          1
```

100 89 2

Hibernate Mapping:

One - Association Mapping:

I) One-to-one (non-collection)

II) one-to-many(collection dependent)

III) many-to-many(non-collection)

IV) many-to-many(collection dependent)

*) Two classes can have relation with each other using HAS-A relation, here 2 tables are created for 2 classes those contains fkcolumn to link each other table.

*) Always code, XML changes comes at parent class level and table changes comes at * level.

Many-to-one: One child record from child table can have connection with multiple (zero or more) parent table records.

*) many-to-many is non-collection configuration.

*) For this case changes comes at parent table child table primary key (PK) will become parent table Foregin key (FK).

Many-to-One Example Program:

```
package com.app.model;

public class Employee {
      private int empId;
      private String empName;
      private double empSal;
      private Address addr;
      public Employee() {
            super();
      }
      public Employee(int empId, String empName, double empSal, Address addr)
{
            super();
            this.empId = empId;
            this.empName = empName;
            this.empSal = empSal;
            this.addr = addr;
      }
      public int getEmpId() {
            return empId;
      }
      public void setEmpId(int empId) {
            this.empId = empId;
      }
      public String getEmpName() {
            return empName;
```

```
    }
    public void setEmpName(String empName) {
        this.empName = empName;
    }
    public double getEmpSal() {
        return empSal;
    }
    public void setEmpSal(double empSal) {
        this.empSal = empSal;
    }
    public Address getAddr() {
        return addr;
    }
    public void setAddr(Address addr) {
        this.addr = addr;
    }
    @Override
    public String toString() {
        return "Employee [empId=" + empId + ", empName=" + empName
                + ", empSal=" + empSal + ", addr=" + addr + "]";
    }


}
```

```
package com.app.model;

public class Address {
    private int addrId;
    private String loc;
```

```
	public Address() {
		super();
	}
	public Address(int addrId, String loc) {
		super();
		this.addrId = addrId;
		this.loc = loc;
	}
	public int getAddrId() {
		return addrId;
	}
	public void setAddrId(int addrId) {
		this.addrId = addrId;
	}
	public String getLoc() {
		return loc;
	}
	public void setLoc(String loc) {
		this.loc = loc;
	}
	@Override
	public String toString() {
		return "Address [addrId=" + addrId + ", loc=" + loc + "]";
	}



}
```

```
package com.app.model;
```

```
import org.hibernate.Session;
import org.hibernate.SessionFactory;
import org.hibernate.Transaction;
import org.hibernate.cfg.Configuration;

public class Main {
    public static void main(String[] args) {

        Configuration cfg=new Configuration().configure();
        SessionFactory sf=cfg.buildSessionFactory();
        Session ses=sf.openSession();
        Transaction tx=ses.beginTransaction();
        tx.begin();

        Address addr=new Address();
        addr.setAddrId(99);
        addr.setLoc("hyd");

        Employee emp=new Employee();
        emp.setEmpId(50);
        emp.setEmpName("viswa");
        emp.setEmpSal(36000);
        emp.setAddr(addr);

        System.out.println(emp);
                ses.save(emp);


        tx.commit();
        ses.close();

    }
}




<?xml version="1.0" encoding="UTF-8"?>


<!DOCTYPE hibernate-mapping PUBLIC
    "-//Hibernate/Hibernate Mapping DTD 3.0//EN"
    "http://hibernate.sourceforge.net/hibernate-mapping-3.0.dtd">
    <hibernate-mapping>
    <class name="com.app.model.Employee" table="empModel">
    <id name="empId" column="eid"/>
    <property name="empName" column="ename"/>
    <property name="empSal" column="esal"/>
    <many-to-one name="addr"  column="aidpk" class="com.app.model.Address" 
cascade="all"/>
     </class>

    <class name="com.app.model.Address" table="addrModel">
    <id name="addrId" column="aid"/>
    <property name="loc" column="loc"/>

    </class>
    </hibernate-mapping>




<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE hibernate-configuration PUBLIC
        "-//Hibernate/Hibernate Configuration DTD 3.0//EN"
        "http://hibernate.sourceforge.net/hibernate-configuration-3.0.dtd">
```

```
 <hibernate-configuration>
        <session-factory>
        <property name="hibernate.connection.driver_class">oracle.jdbc.driver.OracleDriver</property>
        <property name="hibernate.connection.url">jdbc:oracle:thin:@localhost:1521:XE</property>
        <property name="hibernate.connection.username">system</property>
        <property name="hibernate.connection.password">system</property>
        <property name="hibernate.dialect">org.hibernate.dialect.OracleDialect</property>
        <property name="show_sql">true</property>
        <property name="format_sql">true</property>
        <property name="hbm2ddl.auto">create</property>

        <mapping resource = "employee.hbm.xml"/>
        </session-factory>
        </hibernate-configuration>
```

```
SLF4J: Failed to load class "org.slf4j.impl.StaticLoggerBinder".
SLF4J: Defaulting to no-operation (NOP) logger implementation
SLF4J: See http://www.slf4j.org/codes.html#StaticLoggerBinder for further details.
Employee [empId=50, empName=viswa, empSal=36000.0, addr=Address [addrId=99, loc=hyd]]
Hibernate: select address_.aid, address_.loc as loc1_
    from   addrModel address_   where   address_.aid=?
Hibernate: insert into addrModel(loc, aid) values(?, ?)
Hibernate: insert into empModel(ename, esal, aidpk, eid) values(?, ?, ?, ?)
```

==
==

Inheritance releation mapping in Hibernate (IS-A) :

```
package com.app.model;

public class Person {
     private int personId;
     private String personName;
     public Person() {
          super();
     }
     public Person(int personId, String personName) {
          super();
          this.personId = personId;
          this.personName = personName;
     }
     public int getPersonId() {
          return personId;
     }
     public void setPersonId(int personId) {
          this.personId = personId;
     }
     public String getPersonName() {
          return personName;
     }
     public void setPersonName(String personName) {
          this.personName = personName;
     }
     @Override
     public String toString() {
        return "Person [personId=" + personId + ", personName=" +
personName
                + "]";
    }

}


package com.app.model;

public class Employee  extends Person{

    private int empSal;
    private String empName;
    public Employee() {
        super();
    }
    public Employee(int empSal, String empName) {
        super();
        this.empSal = empSal;
        this.empName = empName;
    }
    public int getEmpSal() {
        return empSal;
    }
    public void setEmpSal(int empSal) {
        this.empSal = empSal;
    }
    public String getEmpName() {
        return empName;
    }
    public void setEmpName(String empName) {
```

```
		this.empName = empName;
	}
	@Override
	public String toString() {
		return "Employee [empSal=" + empSal + ", empName=" + empName +
"]";
	}



}

package com.app.model;

public class Student extends Person{

	private double stdFee;
	private String collegeName;
	public Student() {
		super();
	}
	public Student(double stdFee, String collegeName) {
		super();
		this.stdFee = stdFee;
		this.collegeName = collegeName;
	}
	public double getStdFee() {
		return stdFee;
	}
	public void setStdFee(double stdFee) {
		this.stdFee = stdFee;
	}
	public String getCollegeName() {
```

```
           return collegeName;
      }
      public void setCollegeName(String collegeName) {
           this.collegeName = collegeName;
      }
      @Override
      public String toString() {
           return "Student [stdFee=" + stdFee + ", collegeName=" +
collegeName
                      + "]";
      }



}
```

```
<?xml version="1.0" encoding="UTF-8"?>

<!DOCTYPE hibernate-mapping PUBLIC
    "-//Hibernate/Hibernate Mapping DTD 3.0//EN"
    "http://hibernate.sourceforge.net/hibernate-mapping-3.0.dtd">
    <hibernate-mapping>
    <class name="com.app.model.Person"  table="commantab"  discriminator-
value="person" >
      <id name="personId" column="pid"/>
      <discriminator column="objType" type="string"/>
      <property name="personName" column="pname"/>
      <subclass name="com.app.model.Employee" discriminator-value="emp">
      <property name="empSal" column="empsal"/>
      <property name="empName" column="empname"/>
      </subclass>
      <subclass name="com.app.model.Student" discriminator-value="std">
      <property name="stdFee" column="sfee"/>
      <property name="collegeName" column="cname"/>
      </subclass>

    </class>
    </hibernate-mapping>
```

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE hibernate-configuration PUBLIC
        "-//Hibernate/Hibernate Configuration DTD 3.0//EN"
        "http://hibernate.sourceforge.net/hibernate-configuration-3.0.dtd">

 <hibernate-configuration>
        <session-factory>
        <property 
name="hibernate.connection.driver_class">oracle.jdbc.driver.OracleDriver</property>
        <property 
name="hibernate.connection.url">jdbc:oracle:thin:@localhost:1521:XE</property>
        <property name="hibernate.connection.username">system</property>
        <property name="hibernate.connection.password">system</property>
        <property 
name="hibernate.dialect">org.hibernate.dialect.OracleDialect</property>
        <property name="show_sql">true</property>
        <property name="format_sql">true</property>
        <property name="hbm2ddl.auto">create</property>

        <mapping resource = "employee.hbm.xml"/>
        </session-factory>
        </hibernate-configuration>
```

```
package com.app.model;

import org.hibernate.Session;
import org.hibernate.SessionFactory;
import org.hibernate.Transaction;
import org.hibernate.cfg.Configuration;

public class Main {
    public static void main(String[] args) {

        Configuration cfg=new Configuration().configure();
        SessionFactory sf=cfg.buildSessionFactory();
        Session ses=sf.openSession();
        Transaction tx=ses.beginTransaction();
        tx.begin();

        Person p=new Person();
        p.setPersonId(10);
        p.setPersonName("A");

        Employee e=new Employee();
        e.setPersonId(20);
        e.setPersonName("B");
        e.setEmpName("ABCD");
        e.setEmpSal(3000);

        Student s=new Student();
        s.setPersonId(30);
        s.setPersonName("C");
        s.setStdFee(345.56);
        s.setCollegeName("UBIO School");
        ses.save(p);
        ses.save(e);
        ses.save(s);

        tx.commit();
        ses.close();

    }

}
```

```
SLF4J: Failed to load class "org.slf4j.impl.StaticLoggerBinder".
SLF4J: Defaulting to no-operation (NOP) logger implementation
SLF4J: See http://www.slf4j.org/codes.html#StaticLoggerBinder for further
details.
Hibernate: insert into commantab(pname, objType, pid) values(?, 'person', ?)
Hibernate: insert into commantab(pname, empsal, empname, objType, pid)
values(?, ?, ?, 'emp', ?)
Hibernate: insert into commantab(pname, sfee, cname, objType, pid)
values(?, ?, ?, 'std', ?)

EDIT PID   OBJTYPE    PNAME EMPSAL    EMPNAME    SFEE  CNAME
Edit 10    person     A    -     -          -    -
Edit 20    emp  B     3000 ABCD       -     -
Edit 30    std  C     -    -          345.56     UBIO School
```

```
package com.app;

public class Employee {

	private int empId;
	private String empName;

	public Employee() {
		super();
	}

	public Employee(int empId, String empName) {
		super();
		this.empId = empId;
		this.empName = empName;
	}

	public int getEmpId() {
		return empId;
	}

	public void setEmpId(int empId) {
		this.empId = empId;
	}

	public String getEmpName() {
		return empName;
	}

	public void setEmpName(String empName) {
        this.empName = empName;
    }

    @Override
    public String toString() {
        return "Employee [empId=" + empId + ", empName=" + empName + "]";
    }



}

package com.app;

public class Manager extends Employee{

    private int projectVersion;
    private String projectStatus;
    public Manager() {
        super();
    }
    public Manager(int projectVersion, String projectStatus) {
        super();
        this.projectVersion = projectVersion;
        this.projectStatus = projectStatus;
    }
    public int getProjectVersion() {
        return projectVersion;
    }
    public void setProjectVersion(int projectVersion) {
        this.projectVersion = projectVersion;
    }
    public String getProjectStatus() {
```

```
		return projectStatus;
	}
	public void setProjectStatus(String projectStatus) {
		this.projectStatus = projectStatus;
	}
	@Override
	public String toString() {
		return "Manager [projectVersion=" + projectVersion + ",
projectStatus="
				+ projectStatus + "]";
	}

}



package com.app;

public class Developer extends Employee{

	private  String tech;
	private String tools;
	public Developer() {
		super();
	}
	public Developer(String tech, String tools) {
		super();
		this.tech = tech;
		this.tools = tools;
	}
	public String getTech() {
		return tech;
	}
```

```
      public void setTech(String tech) {
           this.tech = tech;
      }
      public String getTools() {
           return tools;
      }
      public void setTools(String tools) {
           this.tools = tools;
      }
      @Override
      public String toString() {
           return "Developer [tech=" + tech + ", tools=" + tools + "]";
      }


}
```

```
<?xml version="1.0" encoding="UTF-8"?>

<!DOCTYPE hibernate-mapping PUBLIC
    "-//Hibernate/Hibernate Mapping DTD 3.0//EN"
    "http://hibernate.sourceforge.net/hibernate-mapping-3.0.dtd">
    <hibernate-mapping>
    <class name="com.app.Employee"  table="commantab1"  discriminator-value="emp" >
      <id name="empId" column="eid"/>
      <discriminator column="objType" type="string"/>
      <property name="empName" column="ename"/>
      <subclass name="com.app.Manager" discriminator-value="manager">
      <property name="projectVersion" column="pversion"/>
      <property name="projectStatus" column="pstatus"/>
      </subclass>
      <subclass name="com.app.Developer" discriminator-value="developer">
      <property name="tech" column="tech"/>
      <property name="tools" column="tools"/>
      </subclass>

    </class>
    </hibernate-mapping>
```

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE hibernate-configuration PUBLIC
        "-//Hibernate/Hibernate Configuration DTD 3.0//EN"
        "http://hibernate.sourceforge.net/hibernate-configuration-3.0.dtd">

 <hibernate-configuration>
        <session-factory>
        <property
name="hibernate.connection.driver_class">oracle.jdbc.driver.OracleDriver</pr
operty>
        <property
name="hibernate.connection.url">jdbc:oracle:thin:@localhost:1521:XE</propert
y>
        <property name="hibernate.connection.username">system</property>
        <property name="hibernate.connection.password">system</property>
        <property
name="hibernate.dialect">org.hibernate.dialect.OracleDialect</property>
        <property name="show_sql">true</property>
        <property name="format_sql">true</property>
        <property name="hbm2ddl.auto">create</property>

        <mapping resource = "employee.hbm.xml"/>
        </session-factory>
        </hibernate-configuration>
```

```
package com.app;

import org.hibernate.Session;
import org.hibernate.SessionFactory;
import org.hibernate.Transaction;
import org.hibernate.cfg.Configuration;

public class Main {
     public static void main(String[] args) {

          Configuration cfg=new Configuration().configure();
          SessionFactory sf=cfg.buildSessionFactory();
          Session ses=sf.openSession();
          Transaction tx=ses.beginTransaction();
          tx.begin();

          Employee e=new Employee();
          e.setEmpId(101);
          e.setEmpName("Madhu");

          Manager m=new Manager();
          m.setEmpId(102);
          m.setEmpName("Ramesh");
          m.setProjectStatus("ABC");
          m.setProjectVersion(3);

          Developer d=new Developer();
          d.setEmpId(103);
```

```
           d.setEmpName("Raju");
           d.setTech("java");
           d.setTools("eclipse");

           ses.save(m);
           ses.save(e);
           ses.save(d);

           tx.commit();
           ses.close();

     }

}
```

```
SLF4J: Failed to load class "org.slf4j.impl.StaticLoggerBinder".
SLF4J: Defaulting to no-operation (NOP) logger implementation
SLF4J: See http://www.slf4j.org/codes.html#StaticLoggerBinder for further
details.
Hibernate: 
    insert 
    into
        commantab1
        (ename, pversion, pstatus, objType, eid) 
    values
        (?, ?, ?, 'manager', ?)
Hibernate: 
    insert 
    into
        commantab1
        (ename, objType, eid)
    values
        (?, 'emp', ?)
Hibernate: 
    insert 
    into
        commantab1
        (ename, tech, tools, objType, eid) 
    values
        (?, ?, ?, 'developer', ?)
```

EDIT	EID	OBJTYPE	ENAME	PVERSION	PSTATUS	TECH	TOOLS
Edit	102	manager	Ramesh	3	ABC	-	-
Edit	101	emp	Madhu	-	-	-	-
Edit	103	developer	Raju	-	-	java	eclipse

```
============================================================================
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```