CS544
Enterprise Architecture
Exam 1 Sample

Name____

Student ID ____

1. [10 points] **Circle w**hich of the following is TRUE/FALSE concerning Spring Inversion of Control/Dependency Injection:

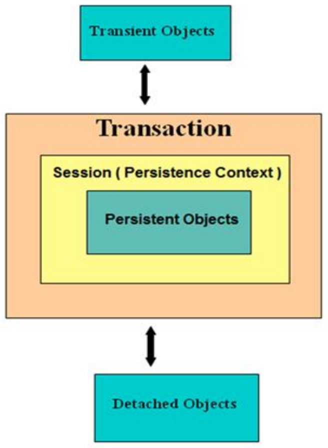
   T **F** Only Managed Beans can be injected in Spring, a POJO or JavaBean cannot.

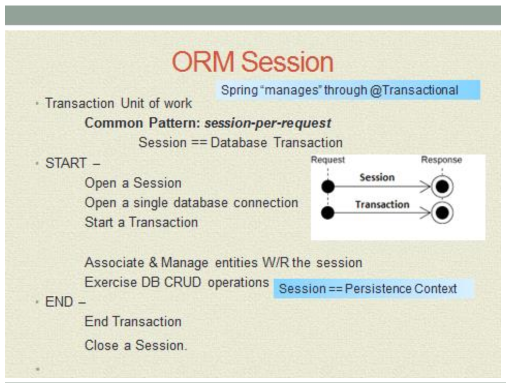
   EXPLAIN:____If the POJO or JavaBean is a Spring Managed bean, they can be injected.

   T **F** @Autowired works only on interfaces. It cannot work directly on classes.

   EXPLAIN:__ It can work on classes. However you lose some of the value, testing; changing implementations

2. [15 points] In JPA, the Persistence Context plays an important role in the implementation of an ORM. Explain, by example the Entity lifecycle as it pertains to the following drawing.





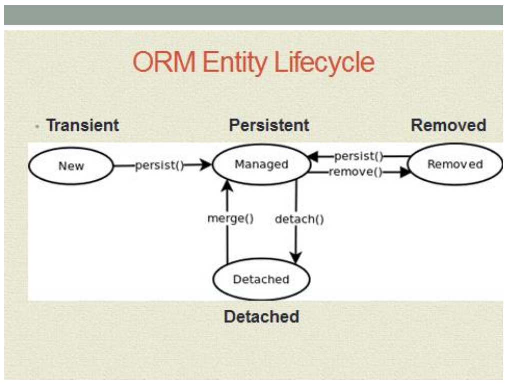
ORM Session

- Transaction Unit of work
    - **Common Pattern: *session-per-request***
        - Session == Database Transaction
- START –
    - Open a Session
    - Open a single database connection
    - Start a Transaction
    - Associate & Manage entities W/R the session
    - Exercise DB CRUD operations
- END –
    - End Transaction
    - Close a Session.

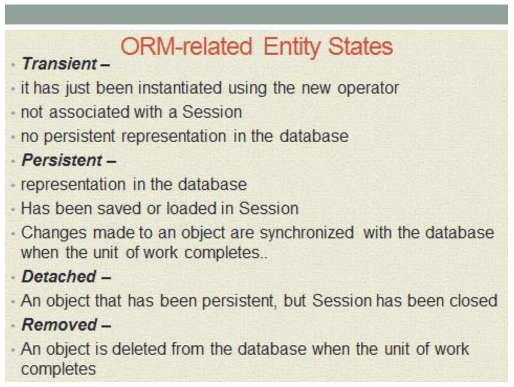
Spring "manages" through @Transactional

Session == Persistence Context

Request
Response
Session
Transaction



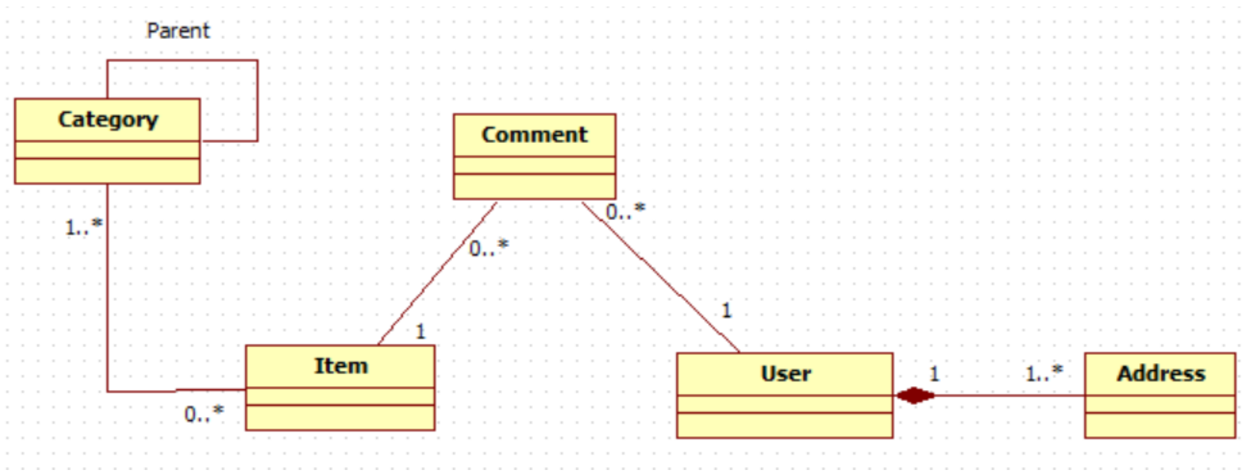
ORM Entity Lifecycle

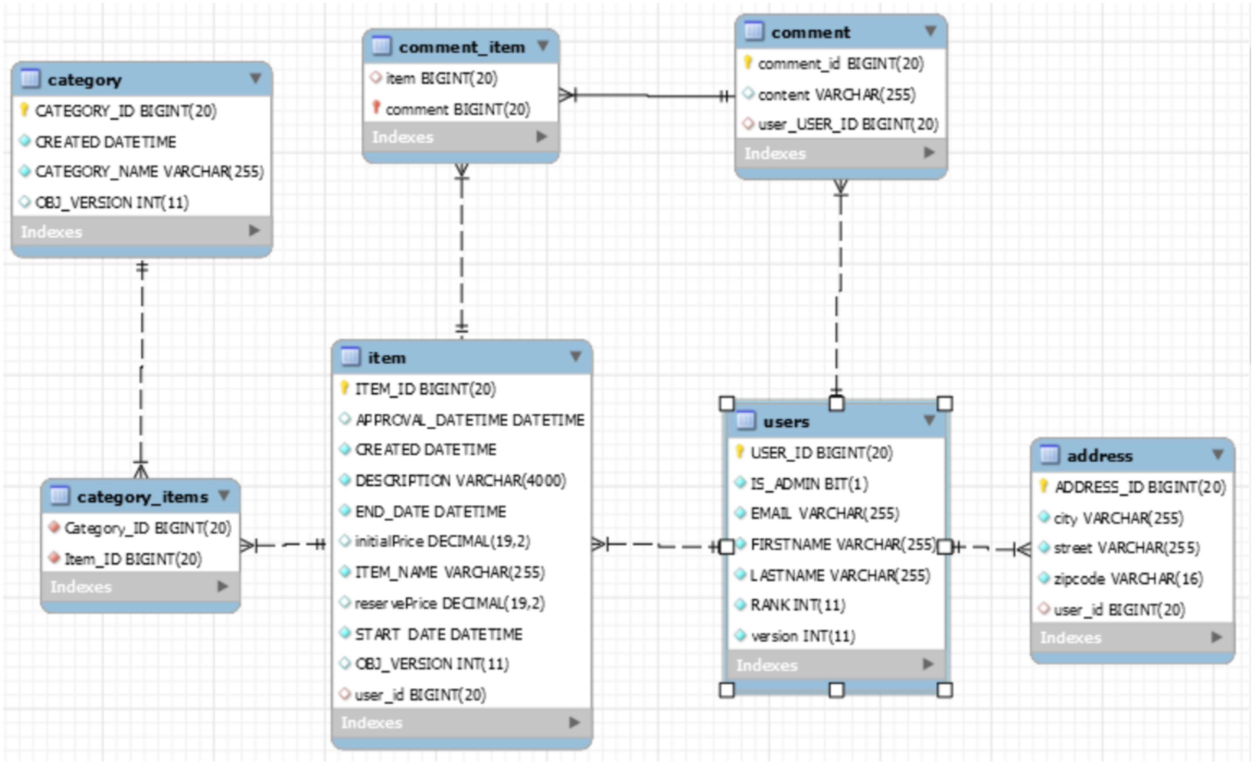


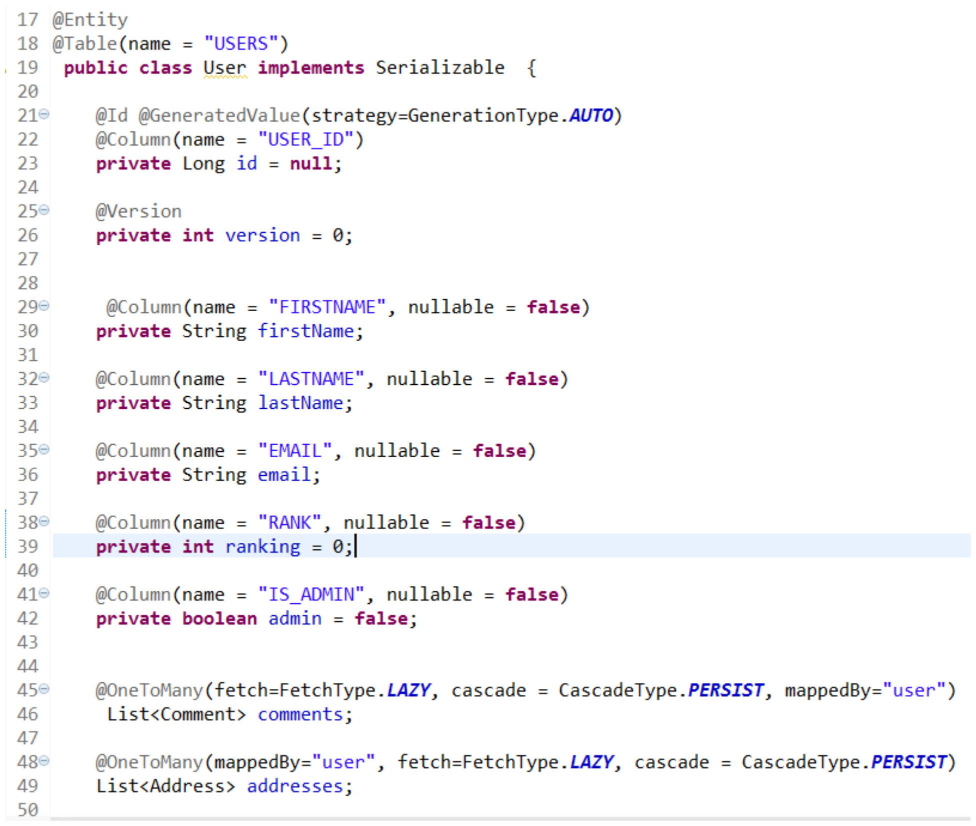
ORM-related Entity States

- ***Transient –***
- it has just been instantiated using the new operator
- not associated with a Session
- no persistent representation in the database
- ***Persistent –***
- representation in the database
- Has been saved or loaded in Session
- Changes made to an object are synchronized with the database when the unit of work completes..
- ***Detached –***
- An object that has been persistent, but Session has been closed
- ***Removed –***
- An object is deleted from the database when the unit of work completes

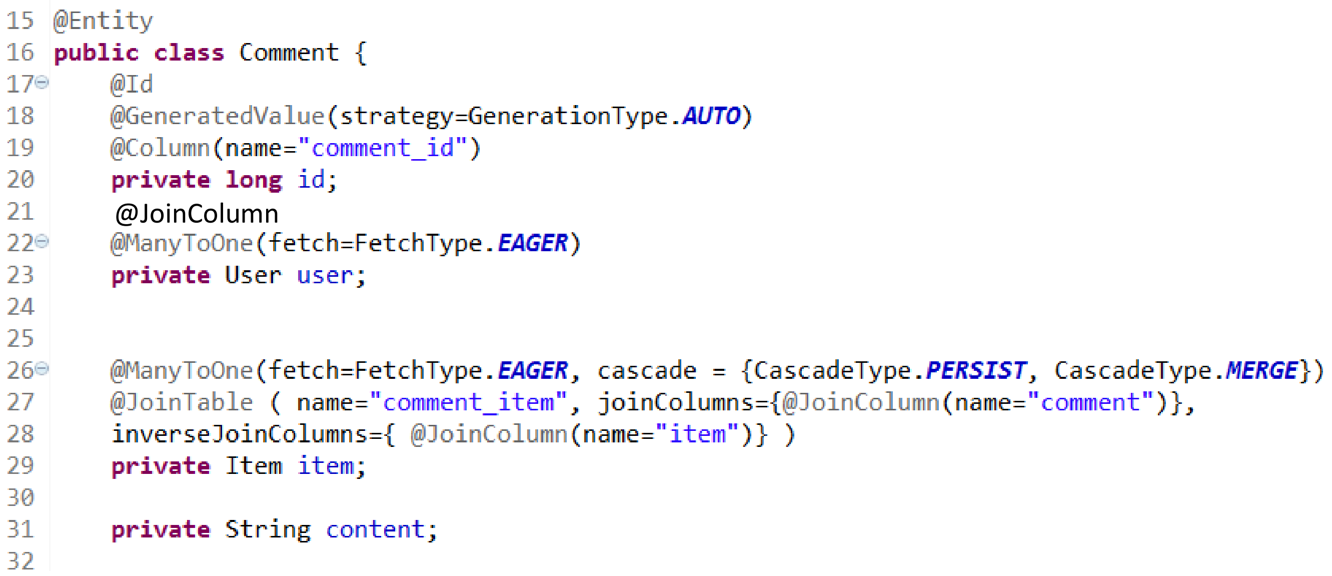
3. [20 points] Annotate the Domain Objects based on the Domain Model and Entity Relationship Diagram provided. NOTE: All the Domain Objects are not listed. All the fields are not listed. Only annotate the objects and fields that are listed.



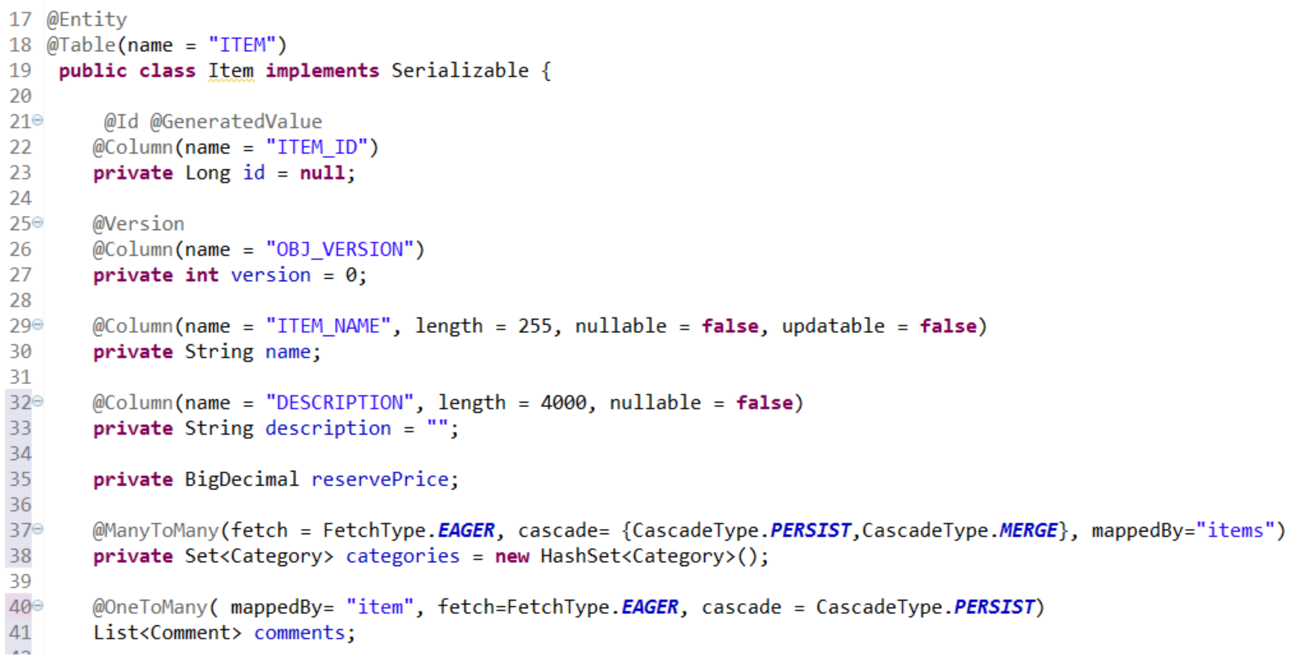




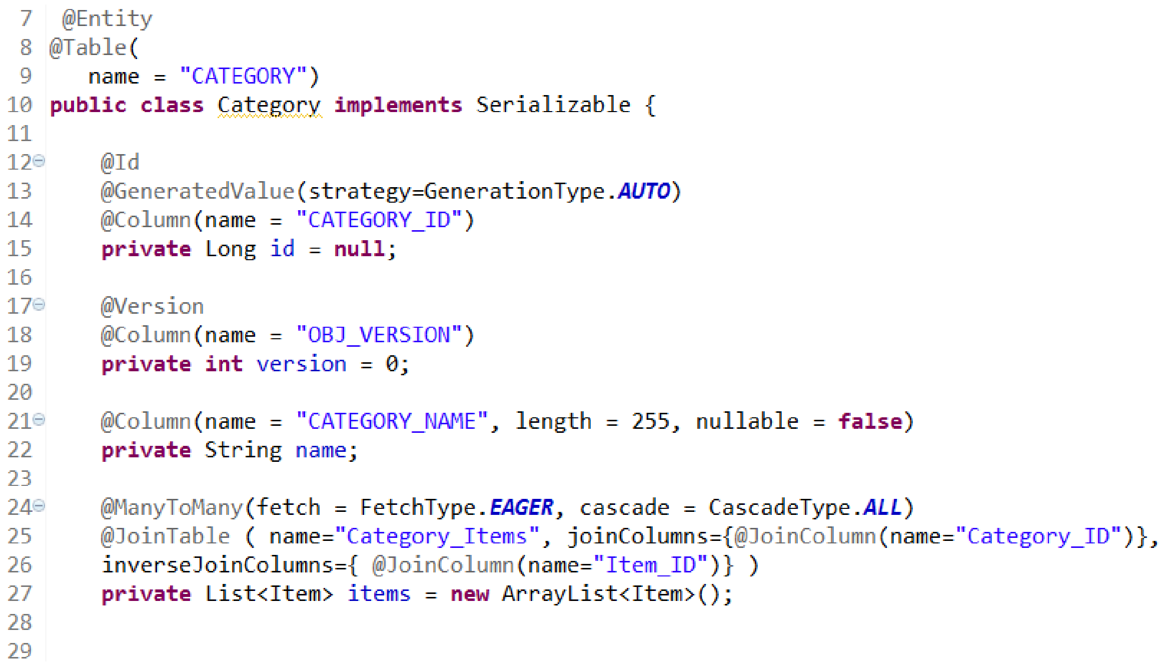
```java
@Entity
@Table(name = "USERS")
 public class User implements Serializable  {

    @Id @GeneratedValue(strategy=GenerationType.AUTO)
    @Column(name = "USER_ID")
    private Long id = null;

    @Version
    private int version = 0;


     @Column(name = "FIRSTNAME", nullable = false)
    private String firstName;

    @Column(name = "LASTNAME", nullable = false)
    private String lastName;

    @Column(name = "EMAIL", nullable = false)
    private String email;

    @Column(name = "RANK", nullable = false)
    private int ranking = 0;

    @Column(name = "IS_ADMIN", nullable = false)
    private boolean admin = false;


    @OneToMany(fetch=FetchType.LAZY, cascade = CascadeType.PERSIST, mappedBy="user")
     List<Comment> comments;

    @OneToMany(mappedBy="user", fetch=FetchType.LAZY, cascade = CascadeType.PERSIST)
    List<Address> addresses;

```



```java
@Entity
public class Comment {
    @Id
    @GeneratedValue(strategy=GenerationType.AUTO)
    @Column(name="comment_id")
    private long id;
     @JoinColumn
    @ManyToOne(fetch=FetchType.EAGER)
    private User user;


    @ManyToOne(fetch=FetchType.EAGER, cascade = {CascadeType.PERSIST, CascadeType.MERGE})
    @JoinTable ( name="comment_item", joinColumns={@JoinColumn(name="comment")},
    inverseJoinColumns={ @JoinColumn(name="item")} )
    private Item item;

    private String content;

```

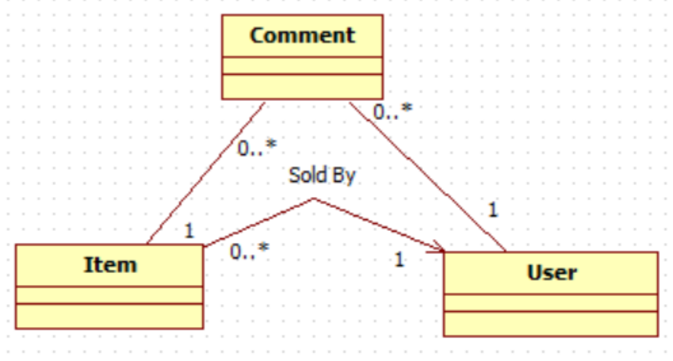


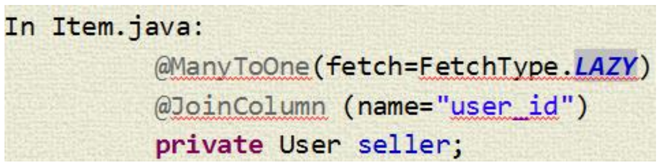
```java
@Entity
@Table(name = "ITEM")
 public class Item implements Serializable {

     @Id @GeneratedValue
    @Column(name = "ITEM_ID")
    private Long id = null;

    @Version
    @Column(name = "OBJ_VERSION")
    private int version = 0;

    @Column(name = "ITEM_NAME", length = 255, nullable = false, updatable = false)
    private String name;

    @Column(name = "DESCRIPTION", length = 4000, nullable = false)
    private String description = "";

    private BigDecimal reservePrice;

    @ManyToMany(fetch = FetchType.EAGER, cascade= {CascadeType.PERSIST,CascadeType.MERGE}, mappedBy="items")
    private Set<Category> categories = new HashSet<Category>();

    @OneToMany( mappedBy= "item", fetch=FetchType.EAGER, cascade = CascadeType.PERSIST)
    List<Comment> comments;
```



```java
 @Entity
@Table(
   name = "CATEGORY")
public class Category implements Serializable {

    @Id
    @GeneratedValue(strategy=GenerationType.AUTO)
    @Column(name = "CATEGORY_ID")
    private Long id = null;

    @Version
    @Column(name = "OBJ_VERSION")
    private int version = 0;

    @Column(name = "CATEGORY_NAME", length = 255, nullable = false)
    private String name;

    @ManyToMany(fetch = FetchType.EAGER, cascade = CascadeType.ALL)
    @JoinTable ( name="Category_Items", joinColumns={@JoinColumn(name="Category_ID")},
    inverseJoinColumns={ @JoinColumn(name="Item_ID")} )
    private List<Item> items = new ArrayList<Item>();


```

4. [15 points] Implement a JQPL **parameterized** query that looks up a User **by email** who is selling a specific Item with an initial price greater than a specified dollar value.
   For example:
   Find John Smith who is selling an Item, "cardboard box" with an initial price greater than 70.00.
   Another example:
   Find Will Henry who is selling an Item named "Pencil Set" with an initial price greater than 100.00.
   Item – User relationship [See relevant class properties in previous problem]:





```
In Item.java:
        @ManyToOne(fetch=FetchType.LAZY)
        @JoinColumn (name="user_id")
        private User seller;
```

Remember the Query is a ***parameterized query***. Also identify all the classes in the specific packages that need to be modified to implement the query in accordance with the N-Tier architecture convention. Describe the "pattern" that exists at the persistence layer.

ANSWER:

edu.mum.dao. UserDao

```
public User findBySoldItemInitialPrice(String email,String itemName, BigDecimal initialPrice);
```

edu.mum.dao.impl. UserDaoImpl

```
public User findBySoldItemInitialPrice(String email, String boughtItem, BigDecimal initialPrice) {
  Query query=entityManager.createQuery("select u from User u, Item i where i.seller.email=:email"
                          + "and i.name = :boughtItem and i.initialPrice > :initialPrice");
  return (User) query.setParameter("boughtItem", boughtItem).
       setParameter("email", email). setParameter("initialPrice", initialPrice).getSingleResult();

}
```

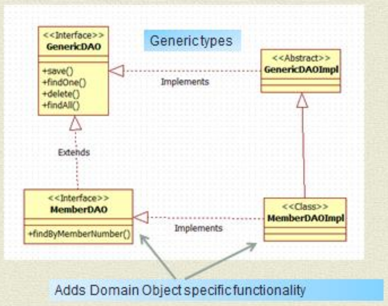
edu.mum.service. UserService

```
public User findBySoldItemInitialPrice(String email,String itemName, BigDecimal initialPrice);
```

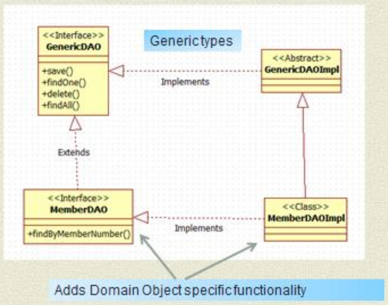
edu.mum.service.impl. UserServiceImpl

```
public User findBySoldItemInitialPrice(String email,String itemName, BigDecimal initialPrice) {
return  userDao.findBySoldItemInitialPrice(email,itemName, BigDecimal initialPrice);

}
```

“Classic” ORM GenericDAO



“Classic” ORM GenericDAO



Generic DAO Implementation

```
public abstract class GenericDaoImpl<T> implements GenericDao<T> {


@PersistenceContext
    protected EntityManager entityManager;
    protected Class<T> daoType;

     public void setDaoType(Class<T> type) {
          daoType = type;
     }
    @Override
    public void save( T entity ){
        entityManager.persist( entity );
     }
    public void delete( T entity ){
        entityManager.remove( entity );
```

Domain Class specific DAO

```
public interface MemberDao extends GenericDao<Member> {
    public Member findByMemberNumber(Integer number);
```

```
public class MemberDaoImpl extends GenericDaoImpl<Member> implements MemberDao
public MemberDaoImpl() {
super.setDaoType(Member.class);
}
 public Member findByMemberNumber(Integer number) {
  Query query = entityManager.createQuery("select m from MEMBER m
                                   where m.memberNumber =:number");
  return (Member) query.setParameter("number", number).getSingleResult();
}
```