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JAVA PERSISTANCE API / SHORT NOTES

1. The JAVA platform is well supported for MANAGING PERSISTANCE to RELATIONAL DATABASES
2. JDBS is an abstraction over proprietary client Interface to the proprietary RELATIONAL DATABASE
3. Enterprise JAVA Beans – Entity Beans were so complex
4. **JDO – JAVA DATA OBJECTS ,** is another PERSISTANCE SPECIFICATION effort in JAVA
5. **JDO** was not so popular and only handful of people started supporting it
6. The science of BRIDGING the gap between the object model and the relational model is known as OBJECT-RELATIONAL MAPPING. Often referred to as O-R mapping
7. The difference between the Object Model and the RELATIONAL model is always knows as IMPEDENCE MISMATCH
8. The JAVA PERSISTANCE API is a LIGHT WEIGHT , POJO-BASED framework for JAVA persistence
9. The JPA persistence is , NON-INTRUSIVE (persistence objects are no aware of the persistence mechanism) , Provides OBJECT QUERIES [EJB-QL], having MOBILE ENTITIES [persistent POJOS can be moved from one layer to another , one JVM to another easily using the DETACHMENT model provided], SIMPLE IN CONFIGURATION , TESTABLE
10. Characteristics of objects which have been transformed in to ENTITIES ,
    a. PERSISTABILITY – entities are persistable , means that they can be made PERSISTANT which means their STATE can be REPRESENTED in a DATA STORE and can be ACCESSED at a later time

b. IDENTITY – Entities have an Identity, both in the OBJECT state and while in the DATA BASE as well
c. TRANSACTIONALITY –Entities created , updated , deleted generally in a TRANSACTION
d. GRANULARITY – Entities are fine-grained objects that have a set of AGGREGATED state that is normally stored in one place such as a ROW in a TABLE

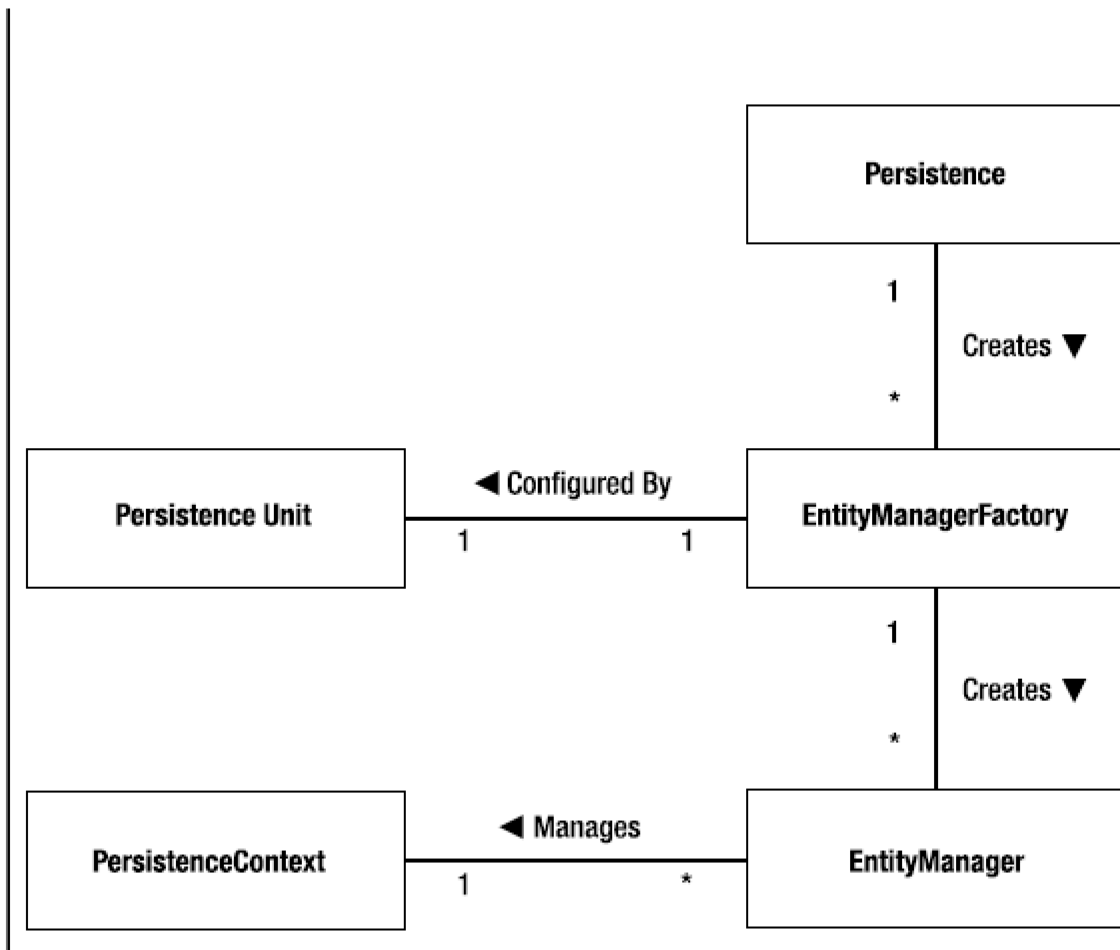
11. Entity META DATA
    a. With entities there is some META-DATA at some point
    b. Entity META-DATA can be either ANNOTAION or XML
12. CONFIGURATION BY EXCEPTION – means that the persistence engine defined defaults that apply to the majority of the applications
13. Simple Entity

```java
package com.scea.jpa;

import javax.persistence.Entity;
import javax.persistence.Id;

@Entity
public class Employee {
    @Id private int id;
    private String name;
    private long salary;

    public Employee(){}
    public Employee(int i){
        this.id = id;
    }
    public int getId() {
        return id;
    }
    public void setId(int id) {
        this.id = id;
    }
    public String getName() {
        return name;
    }
    public void setName(String name) {
        this.name = name;
    }
    public long getSalary() {
        return salary;
    }
    public void setSalary(long salary) {
        this.salary = salary;
    }
}
```

14. When ANNOTATIONS are placed either those can be placed at FIELD or PROPERTY level. That means user can select to ANNOTATE declared FIELD or GETTER METHOD
15. Users can select any of the above , but should adhere to the once that is used in one ENTITY
16. EntityManager interface is used for almost all the PERSISTANT operations

17. The set of MANAGED entity instances within an ENTITY MANAGER at any given time is called its PERSISTANCE CONTEXT
18. Only one JAVA INSTANCE with the same PERSISTANCE INDENTITY may exist in a PERSISTANCE CONTEXT as any time
19. It is the PROVIDER that supplies the BACKING INPLEMENTATION engine for the ENTIRE JAVA PERSISTANCE API
20. All the ENTITY MANAGES come from FACTORIES of ENTITYMANGERFACTORY. The configuration for an entity manger is bound to the EntityMangerFactory that CREATED it. But it is defined SEPARATELY as a PERSISTANCE UNIT
21. PERSITECE UNIT – Dictates either implicit or explicit the SETTINGS and ENTITY CALSSES used by all ENTITY MANGERS obtained from the UNIQUE ENTITY MANGER FACTORY instance BOUND to that PERSISTANCE UNIT

22.



23. An ENTITY MANAGER is always obtained from an ENTITY MANGER FACTORY

24. Creating an ENTITY MANGER FACTORY in J2SE environment

   a. EntityMangerFactroy emf = Persistance.createEntityMangerFactory(“EmployeeService”);

25. Obtaining an Entity Manager
    a. EntityManger em = emf.createEntityManger();
26. Persisting an Entity
    a. Employee emp = new Employee(158);
    b. Em.persist(emp);
27. Finding an Entity
    a. Employee emp = em.find(Employee.class,158)
28. Removing an Entity
29. In order to REMOVE and entity , it must be MANAGED
    a. Employee emp = em.find(Emplyee.class , 158)
    b. em.remove(emp)
30. Updating an Entity
    a. Employee emp = em.find(Employee.class,158);
    b. emp.setSalary(emp.getSalary() + 1000)
31. While updating no ENTITY MANAGER is invoked, For this the ENTITY must be a MANAGED one at this time
32. Except FIND , all other MUST BE INVOKED in a TRANSACTION
33. In case of TRANSACTIONS , the environment in which operations are performed is important , it could be an APPLICATION SERVER or STANDALONG APPLICATION
34. When RUNNING inside a JAVA EE CONTATINER , standard JTA would be in use
35. Transaction Service that should be used in JAVA SE environment is EntityTransaction service
36. In JAVA SE environment
    a. em.getTransaction().begin()

b. createEmployee(158,"John Doe",45000);
c. em.getTransaction().commit()

37.

38. Creating Query

a. Query query = em.createQuery("SELECT e FROM Employee e");
b. Collection emps = query.getResultList();

39. PERSISTANCE UNIT – The configuration that describes the persistence unit is in XML file named "PERSISTANCE.XML"

40. A single persistence.xml file may contain many PERSISTENCE UNIT configurations

41.

```
<persistence>
    <persistence-unit name="EmployeeService" transaction-type="RESOURCE_L
        <class>examples.model.Employee</class>
        <properties>
            <property name="toplink.jdbc.driver"
                      value="org.apache.derby.jdbc.ClientDriver"/>
            <property name="toplink.jdbc.url"
                      value="jdbc:derby://localhost:1527/EmpServDB;create
            <property name="toplink.jdbc.user" value="APP"/>
            <property name="toplink.jdbc.password" value="APP"/>
        </properties>
    </persistence-unit>
</persistence>
```

42. A persistence archive is a SIMPLE JAR file containing PERSISTANCE.XML in META-INF folder

43. DEPENDENCY MANAGEMENT can be done through Dependency Lookup and Dependency Injection.

44. Dependency Look up is traditional from of Dependency management in JEE , where application code is responsible for using JNDI to look up named references
45. The process of automatically looking up a resource and setting it into the class is called DEPENDENCY INJECTION
46. The server is said to inject the resolved dependency in to the class and this is known as DEPENDENCY INJECTION
47. There are Few FORMS of DEPENDENCY INJECTION , FIELD INJECTION and SETTER INJECTION
48. Referencing a PERSISTENCE CONTEXT

   a. **Listing 3-14.** *Injecting an* `EntityManager` *Instance*

```
@Stateless
public class EmployeeServiceBean implements EmployeeService {
    @PersistenceContext(unitName="EmployeeService")
    EntityManager em;

    // ...
}
```

49. Referencing a PERSISTENCE UNIT

a.

Listing 3-15. *Injecting an* `EntityManagerFactory` *Instance*

```
@Stateful
public class EmployeeServiceBean implements EmployeeService {
    @PersistenceUnit(unitName="EmployeeService")
    private EntityManagerFactory emf;
    private EntityManager em;

    @PostConstuct
    public void init() {
        em = emf.createEntityManager();
    }

    // ...
}
```

50. REFERENCING AN EJB

Listing 3-16. *Qualifying an EJB Reference Using the Bean Name*

```
@Stateless
public class DeptServiceBean implements DeptService {
    @EJB(beanName="AuditServiceBean")
    AuditService audit;

    // ...
}
```

a.

51. Referencing Server RESOURCE

a.

Listing 3-17. *Injecting a* SessionContext *instance*

```
@Stateless
@EJB(name="audit", beanInterface=AuditService.class)
public class DeptServiceBean implements DeptService {
    @Resource SessionContext context;
    AuditService audit;

    @PostConstruct
    public void init() {
        audit = (AuditService) context.lookup("audit");
    }

    // ...
}
```

52. RESOURCE LOCAL transactions are ALWAYS demarcated by the APPLICATION
53. CONTAINER MANAGED transactions may EITHER be demarcated AUTOMATICALLY by the CONTAINER or by using JTA interface that support APPLICATION CONTROLLED demarcation
54. EJB may use wither CONTAINER MANAGED or BEAN MANAGED TRANSACTION
55. SERVLETS are limited to somewhat poorly named BEAN MANAGED TRANSACTIONS
56. The DEFAULT transaction management STYLE for EJB is CONTAINER MANAGED TRANSACTIONS
57. A Message Driven Bean fully support Injecting Entity Manager and can leverage CONTAINER MANAGED transactions as well
58. Adding the STATELESS SESSION beans as components to MANAGE PERSISTANCE operations is the PREFERRED strategy for JAVA EE APPLICATIONS

59.

```
@Stateless
public class DepartmentServiceBean {
    @PersistenceContext(unitName="EmployeeService")
    EntityManager em;

    public void addEmployeeToDepartment(int empId, int deptId) {
        Employee emp = em.find(Employee.class, empId);
        Department dept = em.find(Deptartment.class, deptId);
        dept.getEmployees().add(emp);
        emp.setDept(dept);
    }

    // ...
}
```

60. STATEFULL SESSION BEANS are also well suited to MANAGING PERSISTANCE OPEATAIONS within an APPLICATION COMPONENT MODEL

61. The ability to STORE the STATE on the SESSION BEAN allows creating QUERY criteria or other CONVERSATIONAL state CONSTRUCTED ACROSS multiple METHOD CALLS

62.

```
@Stateful
public class ShoppingCartBean implements ShoppingCart {
    @PersistenceContext(unitName="order")
    private EntityManager em;
    private Order order = new Order();

    public void addItem(Item item, int quantity) {
        order.addItem(item, quantity);
    }

    // ...

    @Remove
    public void checkout(int paymentId) {
        order.setPaymentId(paymentId);
        em.persist(order);
    }
}
```

63. In JAVA EE environment, many properties required in the PERSISTENCE.XML file for JAVA EE may be omitted. Instead of JDBC properties for creating a connection , it is possible to add DATA SOURCE NAME , jdbc/EmployeeDS

64. At some situations when not all the data is required , LAZY FETCHING can be used.The FETCH TYPE of a BASIC mapping can be declared as LAZY as follows

```
@Basic(fetch=FetchType.LAZY)
@Column(name="COMM")
private String comments;
```

65. Persistence provider is not REQUIRED to provide LAZY fetching , this is only a HINT to the PERSISTENCE provider
66. It is NEVER a good idea to LAZY FETCH SIMPLE types in an ENTITY
67. LAZY FETCHING is better when it comes to RELATIONSHIP MAPPINGS
68. CLOB holds CHARACTER LLARGE OBJECT while BLOB holds BINARY LARGE OBJECTS

```
@Entity
public class Employee{
        @Id
        private int id;
        @Basic(fetch=FetchType.LAZY)
        @Lob @Column(name="PIC")
        private byte[] picture;
}
```

69. Enumerations can have two types , ORDINAL (will take the ordinal values such as 1,2,….n)or STRING(Place the String value), such as

```
@Entity
public class Employee{
        @Id
        private int id;
        @Enumerated(EnumType.STRING)
```

```
        private EmployeeType type;
    }
```

70. TEMPARAL types are TIME BASED types used in PERSISTENCE mapping. The type SQL are completely hassle free and do not need special consideration. Java.Util types need additional attention. There are THREE enumerated values of DATE , TIME and TIMESTAMP to use with java.util types.
    a. java.sql.Date
    b. java.sql.Time
    c. java.sql.Timestamp
    d. java.util.Date
    e. java.util.Calendar

```
@Entity
public class Employee{
    @Id
    private int id;
    @Temporal(TemporalType.DATE)
    private Calendar dob;
}
```

71. Use @Transient , or transient keyword to keep Entity properties from saving in to persistence store
72. There are different ID GENERATION algorithms in use in JPA
73. AUTO , TABLE , SEQUENCE , IDENTITY would be used for generating id
    a. AUTO – Application does not care what kind of generation is used by the PROVIDER but wants generation to occur. The AUTO mode is really a DEVELOPMENT or PROTOTYPE strategy

   b. TABLE – Id generation using table is the most flexible and portable way.
   c. SEQUENCE – Id generation using a DATABASE sequence
   d. IDENTITY – Id generation using Database Identity. Some DBs support PRIMARY key IDENTITY columns.

74. SINGLE VALUED ASSOCIATION – An association from an ENTITY instance to ANOTHER (where the CARDINALITY of the TARGET is ONE) is called a SINGLE VALUED ASSOCIATION , Many-to-One and One-to-One fall to this category
75. COLLECTION VALUED ASSOCIATION – when the source entity references one or more TARGET entity instances , a MANY VALUES association is used – One to Many and Many to Many fall in to this category
76. There are few mapping type
   a. Many-to-One

```
@Entity
public class Employee {
    @Id private int id;
    private String name;
    @OneToOne
    @JoinColumn(name="PSPACE_ID")
    private ParkingSpace parkingSpace;
    // ...
}
```

i.

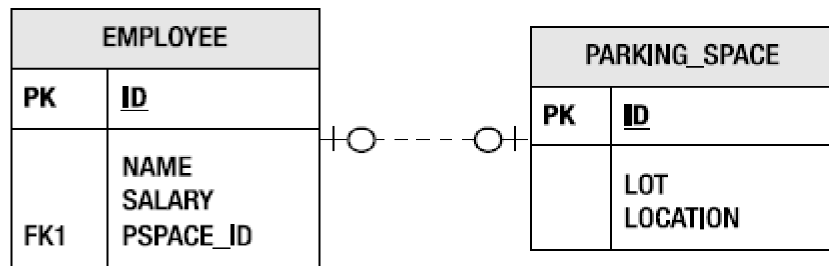


Figure 4-12. EMPLOYEE *and* PARKING_SPACE *tables*

b. One-to-One

```
@Entity
public class Employee {
    @Id private int id;
    private String name;
    @OneToOne
    @JoinColumn(name="PSPACE_ID")
    private ParkingSpace parkingSpace;
    // ...
}
```

i.

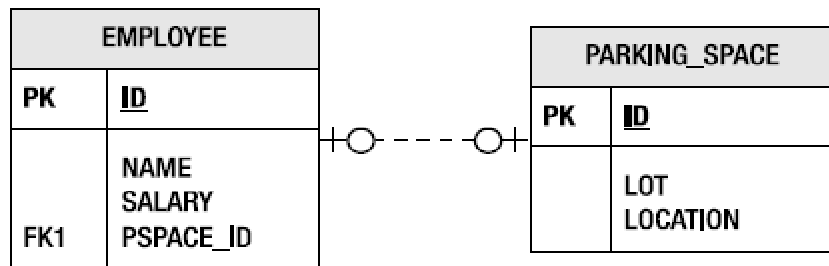


Figure 4-12. EMPLOYEE *and* PARKING_SPACE *tables*

ii. Bi Directional One-to-One

iii.

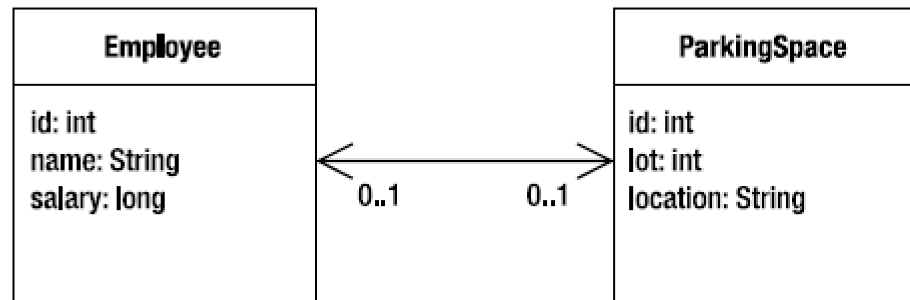


Figure 4-13. *One-to-one relationship between* Employee *and* Pa

```
@Entity
public class ParkingSpace {
    @Id private int id;
    private int lot;
    private String location;
    @OneToOne(mappedBy="parkingSpace")
    private Employee employee;
    // ...
}
```

iv.

```
@Entity
public class Employee {
    @Id private int id;
    private String name;
    @OneToOne
    @JoinColumn(name="PSPACE_ID")
    private ParkingSpace parkingSpace;
    // ...
}
```

v.

vi. One-to-One Primary Key Mapping

vii. A specific case of a UNIQUE ONE-to-ONE relationship is when the primary keys of the related entities are GURANTEED to match

```
@Entity
public class Employee {
    @Id private int id;
    private String name;
    @OneToOne(mappedBy="employee")
    private ParkingSpace parkingSpace;
    // ...
}

@Entity
public class ParkingSpace {
    @Id private int id;
    private int lot;
    private String location;
    @OneToOne
    @PrimaryKeyJoinColumn
    private Employee employee;
    // ...
}
```

viii.

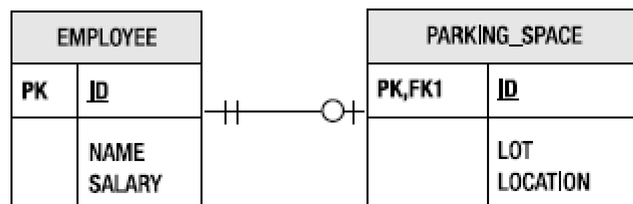


Figure 4-14. EMPLOYEE *and* PARKING_SPACE *tables with shared primary keys*

c.

d. One-to-Many

i. A BI DIRECTIONAL One-to-Many mapping ALWAYS implies Many-to-One mapping back to the SOURCE

ii.

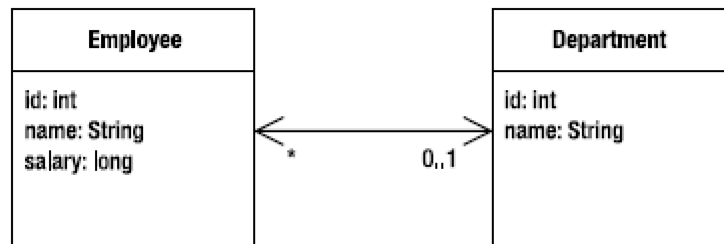


Figure 4-15. *Bidirectional* Employee *and* Department *relationship*

iii. One to Many association is almost ALWAYS BI DIRECTIONAL

Listing 4-20. *One-to-Many Relationship*

```
@Entity
public class Department {
    @Id private int id;
    private String name;
    @OneToMany(mappedBy="department")
    private Collection<Employee> employees;
    // ...
}
```

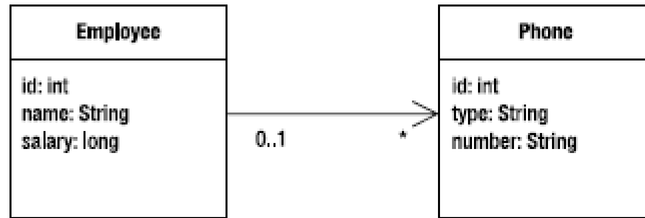
iv.

v. There are important points to remember when mapping One to Many associations , Many-to-One side is the OWNING side, so the JOIN COLUMN is defined on that side

vi. The One-to-Many mapping is the INVERSE side, so the MAPPED BY is on that side

vii. There are One-To-Many UNIDIRECTIONAL mappings also available

viii. Unidirectional mappings need a JOIN TABLE

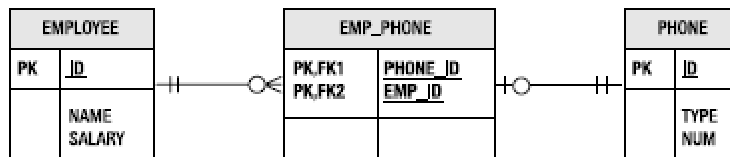


ix. **Figure 4-18.** *Unidirectional one-to-many relationship*

x.

Listing 4-24. *Unidirectional One-to-Many Relationship*

```
@Entity
public class Employee {
    @Id private int id;
    private String name;
    @OneToMany
    @JoinTable(name="EMP_PHONE",
          joinColumns=@JoinColumn(name="EMP_ID"),
          inverseJoinColumns=@JoinColumn(name="PHONE_ID"))
    private Collection<Phone> phones;
    // ...
}
```



xi. **Figure 4-19.** *Join table for a unidirectional one-to-many relationship*

e. Many-to-Many

   i. The ONLY way to implement a Many-To-Many relationship is with a SEPARATE JOIN table

Listing 4-22. *Many-to-Many Relationship Between* `Employee` *and* `Project`

```
@Entity
public class Employee {
    @Id private int id;
    private String name;
    @ManyToMany
    private Collection<Project> projects;
    // ...
}

@Entity
public class Project {
    @Id private int id;
    private String name;
    @ManyToMany(mappedBy="projects")
    private Collection<Employee> employees;
    // ...
}
```

ii.

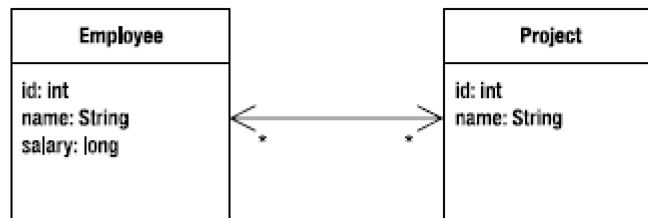


Figure 4-16. *Bidirectional many-to-many relationship*

```
@Entity
public class Employee {
    @Id private int id;
    private String name;
    @ManyToMany
    @JoinTable(name="EMP_PROJ",
          joinColumns=@JoinColumn(name="EMP_ID"),
          inverseJoinColumns=@JoinColumn(name="PROJ_ID"))
    private Collection<Project> projects;
    // ...
}
```

iii.

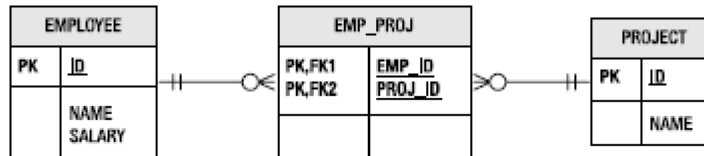
iv. 

Figure 4-17. *Join table for a many-to-many relationship*

v. When one side of the Many-to-Many relationship does not have a mapping to the other , then it is a UNIDIRECTIONAL relationship

vi. The Join table must still be used, the difference is that only ONE of the TWO entity types ACTUALLY uses the table to LOAD its related entities or UPDATES it to store additional entity ASSOCIATIONS

vii. In BOTH two UNIDIRECTIONAL collection VALUED cases , there is no COLLECTION ATTRIBUTE in the TARGET ENTITY, **mappedBy** elements will not be PRESENT in the @OneToMany annotation on the SOUECE ENTITY.

77. PERSISTENCE UNIT – Named configuration of ENTITY classes
78. PERSISTENCE CONTEXT – Managed set of ENTITY INSTANCES
79. There are THREE different types ENTITY MANGERS
    a. CONTAINER MANAGED ENTITY MANAGERS – Container manages the LIFECYCLE of the ENTITY MANAGER

i. TRANSACTION SCOPED CONTAINER MANAGED ENTITY MANGERS – The persistence context that the Transaction Manager works with would be decided by the ACTIVE JTA transaction. Whenever the ENTITY MANAGER is injected into the em filed using @PersistenceContext. Transaction Scoped ENTITY MANAGERS are STATELESS
    1. All CONTAINER MANAGED ENTITY MANAGERS depend on JTA TRANSACTIONS
    2. ENTITY MANAGER can use the JTA as a way to track PERSISTANCE CONTEXT associated with it
    3. Every time when an operation is invoked on ENTITY MANAGER it checks in the JTA whether existing PERSISTANCE CONTEXT, if yes use that , if no CREATE NEW
    4. When the TRANSACTION ENDS , PERSISTANCE CONTEXT goes away

ii. EXTENDER COTNAINER MANAGED ENTITY MANAGERS – Works with a SINGLE persistence context that is tied to the life cycle of a STATEFULL SESSION BEAN
    1. Prevents ENTITIES becoming DETACHED when transaction ENDS

2.

```
@Stateful
public class DepartmentManagerBean implements DepartmentManager {
    @PersistenceContext(unitName="EmployeeService",
                        type=PersistenceContextType.EXTENDED)
    EntityManager em;
    Department dept;

    public void init(int deptId) {
        dept = em.find(Department.class, deptId);
    }

    public void setName(String name) {
        dept.setName(name);
    }

    public void addEmployee(int empId) {
        Employee emp = em.find(Employee.class, empId);
        dept.getEmployees().add(emp);
        emp.setDepartment(dept);
    }

    // ...

    @Remove
    public void finished() {
    }
}
```

3. The EXTENDED persistence context allows STATEFUL session beans to be written in w way that is more NATURAL

4. EXTENDED entity manager CREATES a PERSISTENCE CONTEXT when a STATEFUL session bean instance is created that LASTS until the bean is REMOVED
5. The BIGGEST limitation of the EXTENDED persistence context is that it REQUIRES a STATEFULL SESSION BEAN

b. APPLICATION MANAGED ENTITY MANAGERS
    i. Any ENTITY MANAGER created by calling createEntityManager() method on an ENTITYMANAGERFACTORY is an APPLICATION MANAGED ENTITY MANAGER
    ii. Application manages the LIFECYCLE of the ENTITY MANAGER
    iii. APPLICATION MANAGED ENTITY MANAGERS are the only available option in J2SE environment

iv. To

Listing 5-5. *Application-Managed Entity Managers in Java SE*

```
public class EmployeeClient {
    public static void main(String[] args) {
        EntityManagerFactory emf =
            Persistence.createEntityManagerFactory("EmployeeService");
        EntityManager em = emf.createEntityManager();

        Collection emps = em.createQuery("SELECT e FROM Employee e")
                            .getResultList();
        for (Iterator i = emps.iterator(); i.hasNext();) {
            Employee e = (Employee) i.next();
            System.out.println(e.getId() + ", " + e.getName());
        }

        em.close();
        emf.close();
    }
}
```

v.

vi. To create an APPLICATION MANAGED ENTITY MANAGER in JAVA EE environment , use @PersistenceUnit annotation

vii.

Listing 5-6. *Application-Managed Entity Managers in Java EE*

```
public class LoginServlet extends HttpServlet {
    @PersistenceUnit(unitName="EmployeeService")
    EntityManagerFactory emf;

    protected void doPost(HttpServletRequest request, HttpServletResponse response)
{
        String userId = request.getParameter("user");

        // check valid user
        EntityManager em = emf.createEntityManager();
        try {
            User user = em.find(User.class, userId);
            if (user == null) {
                // return error page
                // ...
            }
        } finally {
            em.close();
        }

        // ...
    }
}
```

viii. In terms of PERSISTENCE CONTEXT , application managed entity manager is similar to CONTAINER MANAGED EXTENDED ENTITY MANAGER

ix. If RESOURCE LOCAL transaction is required , then APPLICATION MANAGED ENTITY MANAGERS are the only option in J2EE environment

80. There are TWO transaction MAANGEMENT types supported by JAVA PERSISTENCE API
    a. RESOURCE LOCAL TRANSACTION
    b. JTA TRANSACTIONS
81. CONTAINER MANAGED ENTITY MANAGES always use JTA while APPLICATION MANAGED ENTITY MANAGERS can use either of those
82. Only ONE persistence context could be PROPAGATED with a JTA transaction
83. EXTENDED persistence context would always try to make itself the ACTIVE PERSISTENCE CONTEXT
84. This leads to a situation where TWO PERSISTENCE CONTEXTS COLLIDE with each other
85. There can only be ONE ACTIVE PERSISTENCE CONTEXT per TRANSACTION
86. One way to WORKAROUND this problem is to change the DEFAULT transaction attribute for the STATEFULE SESSION bean that uses EXTENDED persistence context
87. One last option to CONSIDER using an APPLICATION MANAGED entity manager INSTEAD of an EXTENDED ENTITY MANAGER if there is no need to PROPAGATE the persistence context
88. There is no limit to the number of application managed PERSISTENCE CONTEXT that may be SYNCHRONIZED with a transaction, but only one COTNAINER MANAGED PERSISTENCE CONTEXT will ever be associated
89. APPLICATION MANAGED persistence context may be SYNCHRONIZED with JTA transactions. Synchronizing means FLUSH will occur if the transaction commits

90. APPLICATION MANAGED ENTITY MANAGER participate In a JTA transaction in one of two ways

a. If the PERSISTENCE CONTEXT is created INSIDE the TRANSACTION , then the PERSISTENCE PROVIDER will AUTOMATICALLY SYNCHRONIZE the PERSISTENCE CONTEXT with the TRANSACTION
b. If the PERSISTENCE CONTEXT is CREATED EARLIER , outside the transaction , the PERSISTENCE CONTEXT may be MANUALLY SYNCHRONIZED by calling **joinTransaction()** on the ENTITY MANAGER
c. Once SYNCRHONIZED The persistence context will AUTOMATICALLY BE FLUSHED when the transaction COMMITS

Listing 5-12. *Using Application-Managed Entity Managers with JTA*

```
@Stateful
public class DepartmentManagerBean implements DepartmentManager {
    @PersistenceUnit(unitName="EmployeeService")
    EntityManagerFactory emf;
    EntityManager em;
    Department dept;

    public void init(int deptId) {
        em = emf.createEntityManager();
        dept = em.find(Department.class, deptId);
    }

    public String getName() {
        return dept.getName();
    }
```



```
    public void addEmployee(int empId) {
        em.joinTransaction();
        Employee emp = em.find(Employee.class, empId);
        dept.getEmployees().add(emp);
        emp.setDepartment(dept);
    }

    // ...
```

d.

91. PESISTENCE CONTEXT INHERITANCE - When a STATEFUL SESSION BEAN with an EXTENDED PERSISTENCE context creates another STATEFUL SESSION BEAN that also uses an EXTENDED PERSISTENCE CONTEXT , the CHILD will INHERIT from the PARENT

92. A DETACHED entity is one that is not associated with a PERSISTENCE CONTEXT
93. MERGING is the opposite of the DETACHMENT
94. RESOURCE LOCAL TRANSACTIONS – Resource local transactions are controlled by the APPLICATION
95. Applications interact with the RESOURCE LOCAL TRANSACTION by acquiring an implementation of the EntityTransaction interface from the EntityManager
96. The getTransaction() method of the EntityManager interface is used for this purpose
97. The EntityTransaction interface is designed to IMITATE user transaction interface

Listing 5-14. *The* EntityTransaction *Interface*

```
public interface EntityTransaction {
    public void begin();
    public void commit();
    public void rollback();
    public void setRollbackOnly();
    public void getRollbackOnly();
    public void isActive();
}
```

98.

Listing 5-15. *Using the* EntityTransaction *Interface*

```
public class ExpirePasswords {
    public static void main(String[] args) {
        int maxAge = Integer.parseInt(args[0]);
        String defaultPassword = args[1];

        EntityManagerFactory emf =
            Persistence.createEntityManagerFactory("admin");
        try {
            EntityManager em = emf.createEntityManager();

            Calendar cal = Calendar.getInstance();
            cal.add(Calendar.DAY_OF_YEAR, -maxAge);

            em.getTransaction().begin();
            Collection expired =
                em.createQuery("SELECT u FROM User u WHERE u.lastChange > ?1")
                  .setParameter(1, cal)
                  .getResultList();
```

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```
            for (Iterator i = expired.iterator(); i.hasNext();) {
                User u = (User) i.next();
                System.out.println("Expiring password for " + u.getName());
                u.setPassword(defaultPassword);
            }
            em.getTransaction().commit();
            em.close();
        } finally {
            emf.close();
        }
    }
}
```

99.

100. One of the examples of using RESOURCE LOCAL transactions in Application server environment is LOGGING

101. By Default every ENTITY MANAGER operation applies only to the ENTITY SUPPLIED as an ARGUMENT to the OPERATION. The operation will not CASCADE to other entities that have a relationship with the entity that is being operated on

102. Cascading means propagating the operations to the relationships as well. Usually in JPA the CascadeType can be used. PERSIST , REFRESH,REMOVE , MERGE

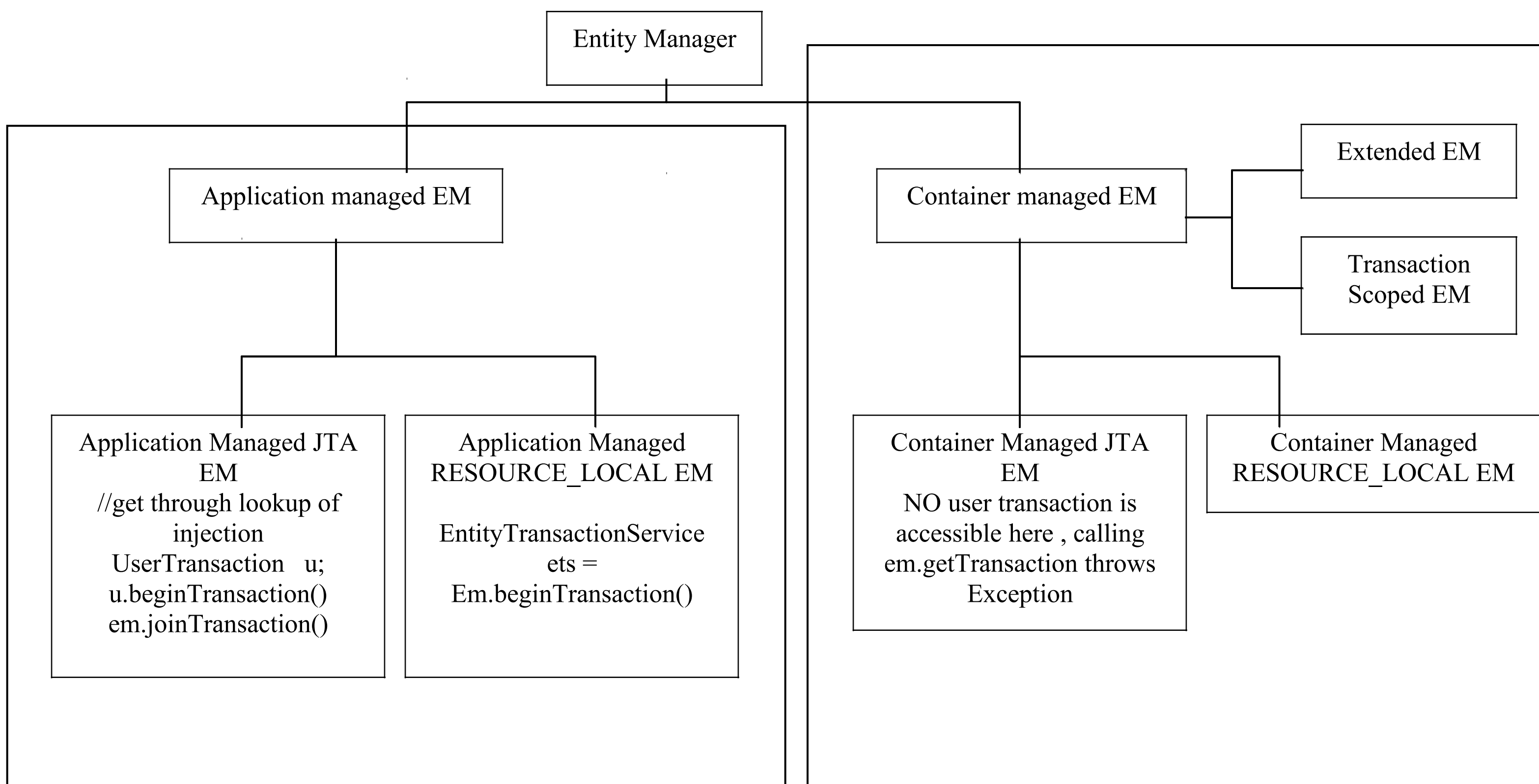
103. REFRESH method of the EntityManager is used to refresh the entity state
104. REFRESH operation is applied only when the ENTITY is MANAGED
105. When REFRESH is invoked it will OVERWRITE the ENTITY STATE from the DATA BASE
106. JPA entities can have CALLBACK methods which are executed whenever a lifecycle method is invoked
107. Those CALLBACK methods could be annotated with,@PrePersist , @PostPersist , @PreUpdate , @PostUpdate , @PreRemove , @PostRemove, @PostLoad
108. Entity LIFECYCLE CALLBACK methods can be defined on ENTITY LISTENERS classes or in the ENTITY itself

```
@Entity
@EntityListeners(com.acme.AlertMonitor.class)
public class Account {

    Long accountId;
    Integer balance;
    boolean preferred;

    @Id
    public Long getAccountId() { ... }
    ...
    public Integer getBalance() { ... }
    ...
   @Transient // because status depends upon nc
   public boolean isPreferred() { ... }
```

109.
110.

```
public class AlertMonitor {

    @PostPersist
    public void newAccountAlert(Account acct) {
        Alerts.sendMarketingInfo(acct.getAccountId(), acct.getBal-
ance());
    }
}
```

111. EXTENDED entity managers can only be used with STATEFUL EJB , with STATELESS and MDB it is not allowed to use
112. JPA ENTITY CLASSES can not use container services such as SECURTIY , TRANSACTION ATTRIBUTES , RESOURCE INJECTIONS since those are not managed UNDER the CONTAINER
113. ENTITY MANAGERS are NOT THREAD SAFE
114. You can INJECT ENTITY MANAGERS to SERVLETS and even JSF BACKING BEANS
115. CONTAINER MANAGED TRANSACTION is not available in WEB CONTAINER , hence you have to use BMT and UserTransaction interface for transaction demarcation if you use JTA resource
116. If “EntityManager.getTransaction()” is invoked on a JTAEntity Manager it would throw an Exception. EntityManager.getTransaction() can only be invoked on NON JTA Entity Managers (RESOURCE_LOCAL). This would return EntityTransactionService interface which mimics the UserTransaction interface



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BEAN MANAGED TRANSACTION CONTAINER MANAGED TRANSACTION

117.