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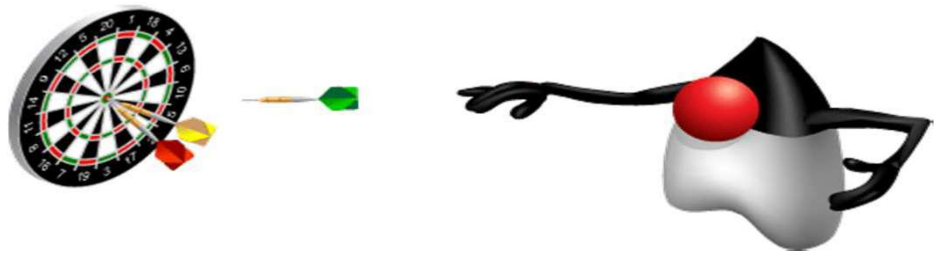
Manipulating JPA Entities With Entity Manager API

Objectives

After completing this lesson, you should be able to do the following:

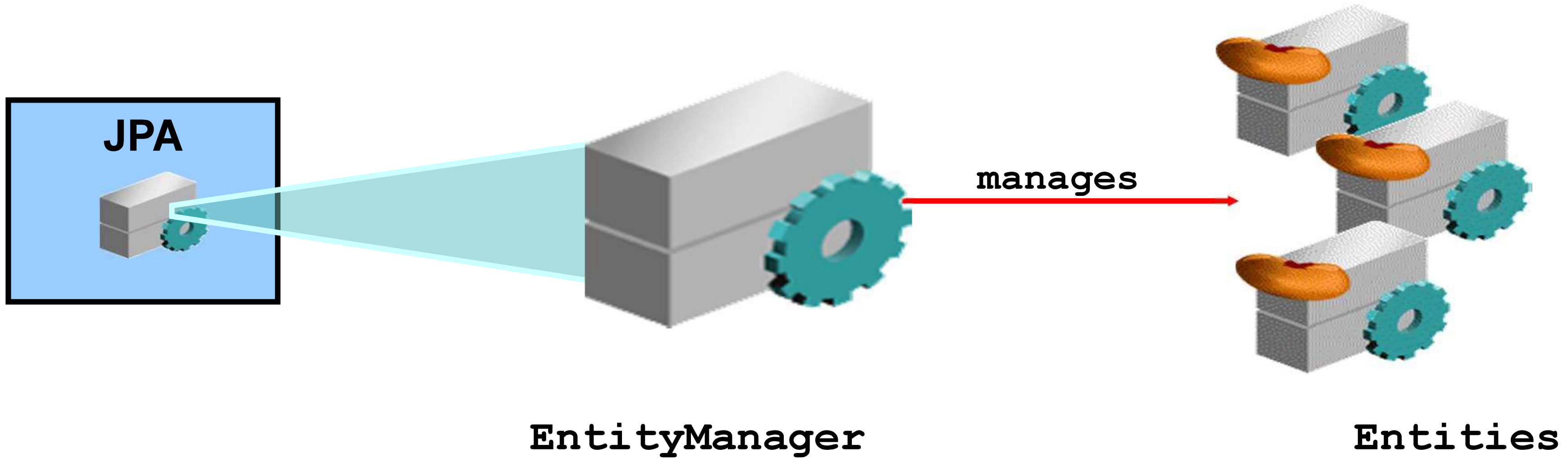
- Declare an `EntityManager` reference with the `@PersistenceContext` annotation
- Look up an `EntityManager` reference by using dependency injection
- Use the `EntityManager` API to:
  - Find an entity by its primary key
  - Insert a new entity
  - Modify an existing entity
  - Delete an entity
- Execute dynamic queries with the `Query` API
- Write simple JPQL queries



What is EntityManager?

EntityManager:

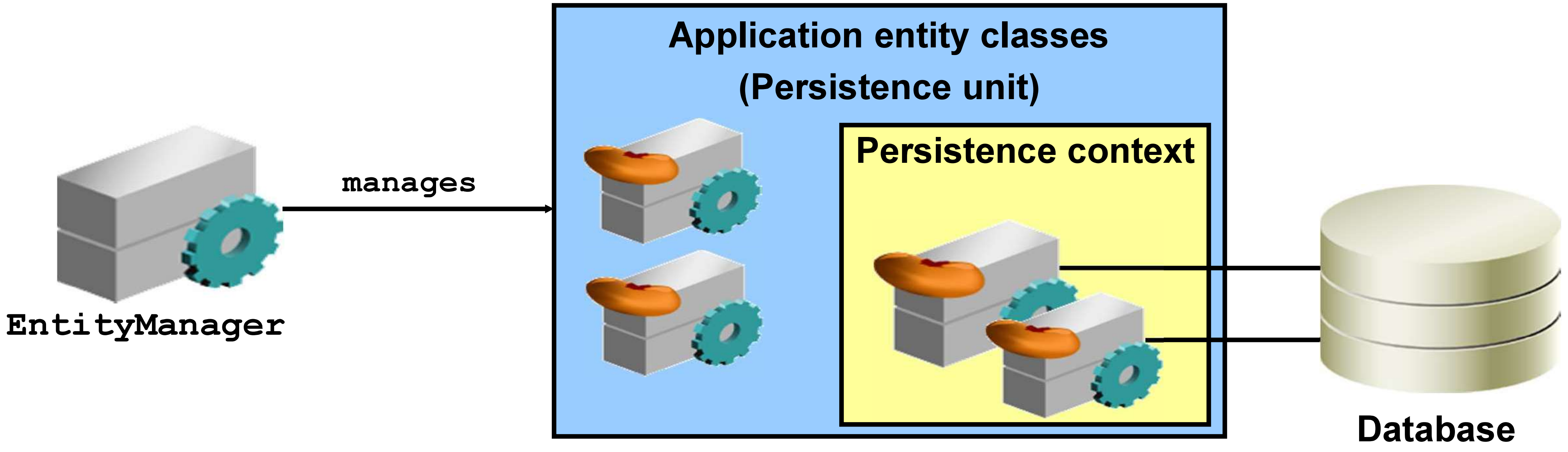
- Is an interface defined in JPA
- Is a standard API for performing CRUD operations for entities
- Acts as a bridge between the object-oriented and the relational models



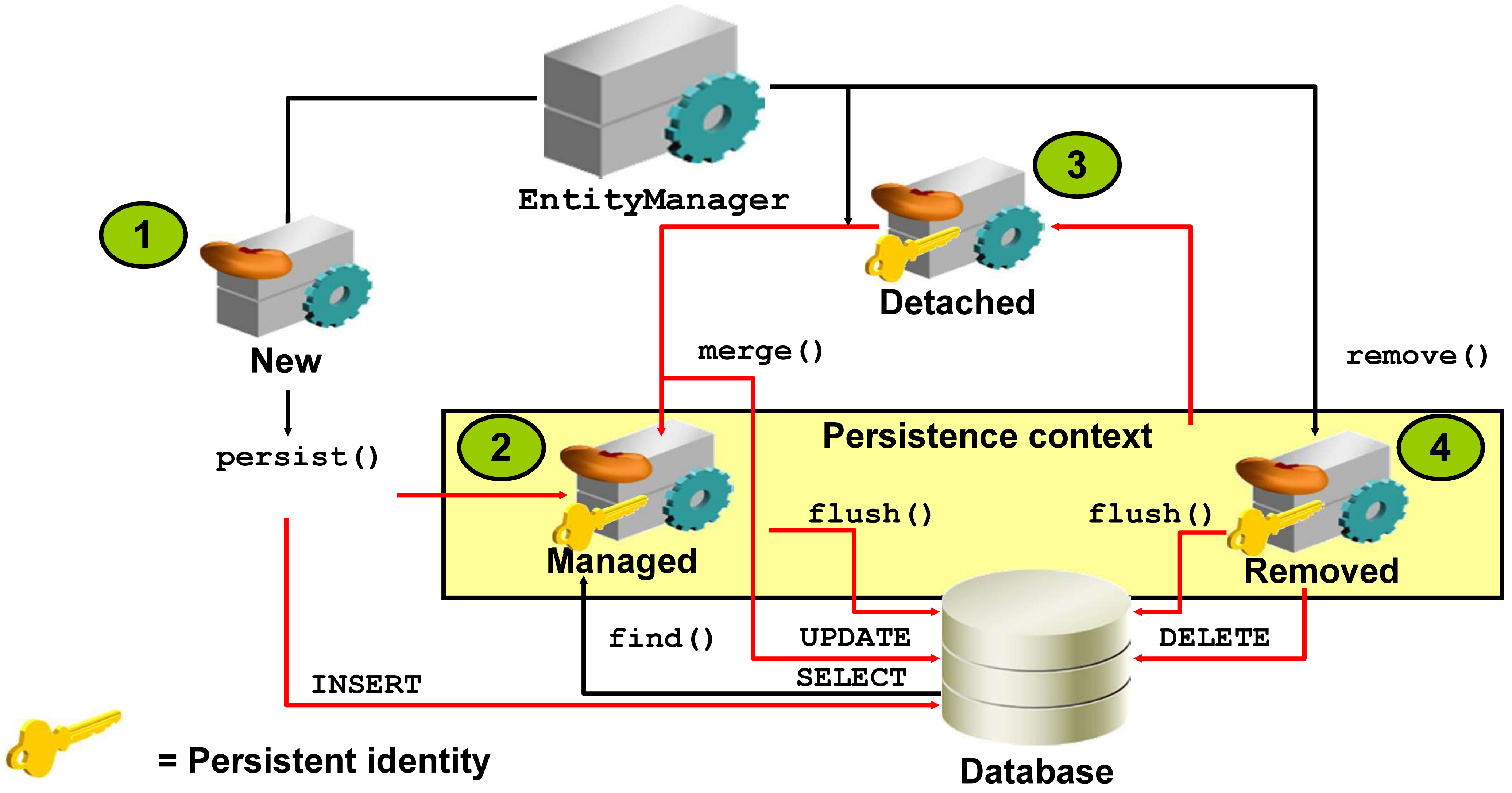
What Is `EntityManager`?

`EntityManager` is:

- Associated with a persistence context
- An object that manages a set of entities defined by a persistence unit



Managing an Entity Life Cycle



Accessing an `EntityManager` Instance

- Container-managed `EntityManager` instances:
  - Are implemented inside a Java EE container
  - Use the `@PersistenceContext` annotation
  - Are obtained in an application through dependency injection or JNDI lookup
- Application-managed `EntityManager` instances:
  - Are implemented outside a Java EE container
  - Are obtainable by using the `EntityManagerFactory` interface

Creating a Container-Managed `EntityManager` Instance

A session bean using container injection:

```
@Stateless

public class CustomerBean {
    @PersistenceContext(unitName="FOD")
    private EntityManager em;
    ...
    public void createCustomer() {
        final Customer cust = new Customer();
        cust.setName("Valli Pataballa");
        ...
        em.persist(cust);
    }
    ...
}
```

Creating an Application-Managed `EntityManager`

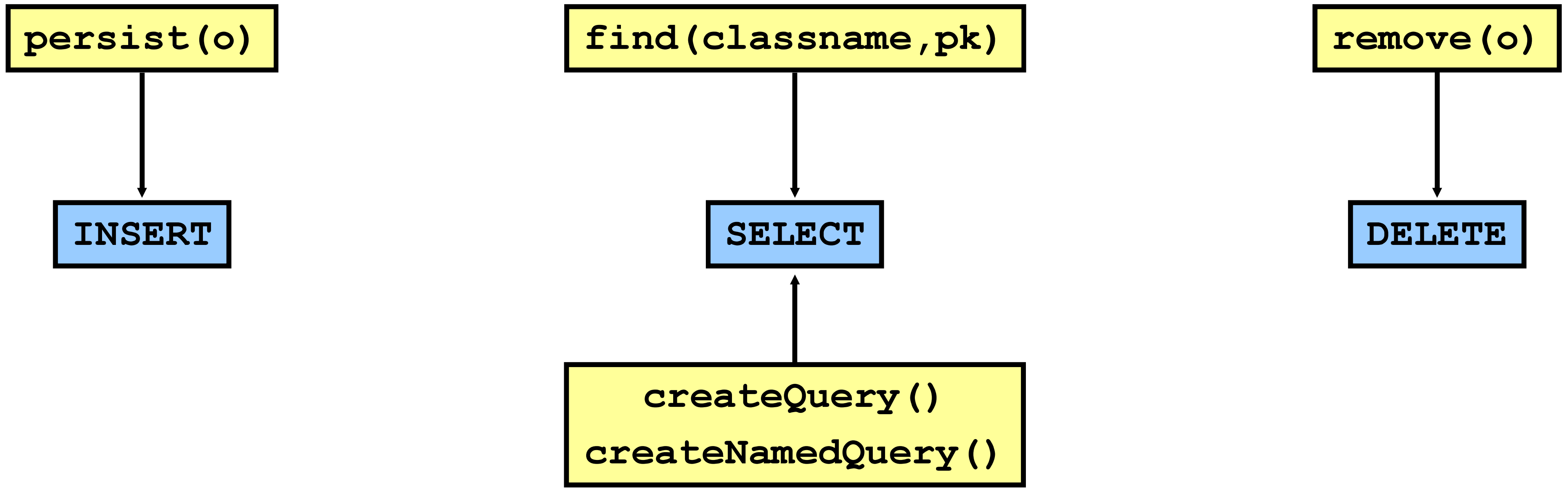
A Java SE application using an `EntityManagerFactory` API:

```
public class CustomerApp {
    public static void main(String args[]) {
        final EntityManagerFactory emf =
          Persistence.createEntityManagerFactory("FOD");
        final EntityManager em = emf.createEntityManager();
        final Customer cust = new Customer()
        cust.setName("Ron Howard");
        ...
        em.persist(cust);


    }
}
```

Specifying Database Operations with

The `EntityManager` API provides the following methods that map to CRUD database operations:



Commonly Used Methods in the

Method signature of the most commonly used methods of the `EntityManager` interface:

```
public void persist(Object entity);
public <T> T merge(T entity);
public void remove(Object entity);
public <T> T find(class<T> entityClass, Object
                                            primaryKey);
public void flush();
public void refresh(Object entity);
public void clear();
public Query createQuery (String jpqlString);
public Query createNamedQuery (String name);
```

Quiz

The application-managed `EntityManager` is implemented outside a Java EE container.

1. True
2. False

Inserting New Data

To insert new data, perform the following steps:

1. Create a new entity object.
2. Call the `EntityManager.persist()` method.

```
@PersistenceContext(unitName="Model")
private EntityManager em; // inject the EntityManager
...                       // object
public void persistUser() {
  Users user = new Users();
  user.setFirstName("Steve");
  user.setLastName("King");

  em.persist(user);
  // On return the user object contains persisted state
  // including fields populated with generated id values
}
```

Deleting Data

To delete data, perform the following steps:

1. Find, set, or refresh the state of the entity to be deleted.
2. Call the `EntityManager.remove()` method.

```
@PersistenceContext(unitName="Model")
private EntityManager em;
...
// Remove a Product by primary key Id value
 public void removeProducts(Products products) {
   products = em.find(Products.class,
                                products.getProdId());
   em.remove(products);
 }
...
```

Updating and Synchronizing the Entity with the Database

1. Retrieve the rows in a database table into the entity by using the `EntityManager` API.
2. Use the setter methods of the entity to update the data attributes.
3. Use the `flush()` method to synchronize the state of the entities in the `EntityManager`'s persistence context with the database.
4. Use the `merge()` method to reattach an entity to the persistence context to synchronize it with the database.

Updating Data

To update data, perform the following steps:

1. Find, set, or refresh the state of the entity to be updated.
2. Call the `EntityManager.merge()` method.

```
@PersistenceContext(unitName="Model")
private EntityManager em;
...
// Update a Product by primary key Id value
 public void updateProducts(Products products) {
   products = em.find(Products.class,
                                       products.getProdId());
   products.setListPrice("1000");
...
   em.merge(products);
 }
...
```

Finding an Entity by Primary Key

To locate an entity by primary key, perform the following steps:

1. Create and set the primary key object and value.
2. Call the `EntityManager find()` method with the following parameters:
   - Entity class
   - Primary-key object

```
import org.srdemo.persistence.Users;
@PersistenceContext(unitName="Model")
private EntityManager em;
...
public Users findUserByPrimaryKey(Long id) {
  Users user = null;
  user = em.find(Users.class, id);
  return user;
}
```

Quiz

The `EntityManager.flush()` method:

1. Retrieves the rows in a database table into the entity
2. Reattaches an entity to the persistence context
3. Synchronizes the state of the entity in the `EntityManager`'s persistence context with the database

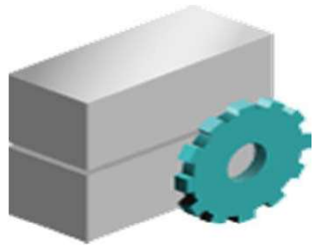
What Is JPA `Query` API?

The JPA `Query` API:

- Includes:
  - `EntityManager` methods to create queries
  - `Query` interface methods for executing queries
  - Java Persistence Query Language (JPQL)
- Supports:
  - Named queries
  - Dynamic queries

Retrieving Entities by Using the `Query` API

The `EntityManager` interface provides the `Query` API methods to execute JPQL statements:



`EntityManager`

- **`createQuery(String jpql)`**
- **`createNamedQuery(String name)`**

`Query` instance methods:

```
setParameter(String, Object)
Object getSingleResult()
List getResultList()
Query setMaxResults(int)
Query setFirstResult(int)
int executeUpdate()
```

Creating Named Queries

To create a named query, perform the following steps:

1. Define the query with the `NamedQuery` annotation.

```
@NamedQuery(name="findUsersByCity",
   query="SELECT object(o) FROM Users o " +
          "where o.city = :city");
```

2. Create a `Query` object for the named query with the `createNamedQuery()` method, setting parameters and returning results.

```
public List<Users> findUsersinCity(String cityName) {
  Query query = em.createNamedQuery("findUsersByCity");
  query.setParameter("city", cityName);
  return query.getResultList();
}
```

Writing Dynamic Queries

Example: Find service requests by primary key and a specified status.

```
public List findServiceRequests(Long id, String status){
  if (id != null && status != null ) {
    Query query = em.createQuery(
     "select object(sr) from ServiceRequests sr " +
     "where sr.svrId = :srvId and sr.status = :status");
    query.setParameter("srvId", id);
    query.setParameter("status", status);
    return query.getResultList();
  }
  return null;
}
```

Summary

In this lesson, you should have learned how to:

- Declare an `EntityManager` reference with the `@PersistenceContext` annotation
- Look up an `EntityManager` reference by using dependency injection
- Use the `EntityManager` API to:
  - Find an entity by its primary key
  - Insert a new entity
  - Modify an existing entity
  - Delete an entity
- Execute dynamic queries with the `Query` API
- Write simple JPQL queries