

# Web Development with Jakarta Server Pages and Servlets

## Session: 8

# Database Access and Event Handling



# Objectives

- ❖ Explain database handling in Servlets using JDBC 4.3
- ❖ Describe JPA and its role
- ❖ Describe connecting database using JPA
- ❖ Explain the significance of session handling and session events
- ❖ Identify different types of listener interfaces used in Servlets
- ❖ Explain JDBC versus JPA

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# Introduction

## Using Java Database Connectivity (JDBC) API

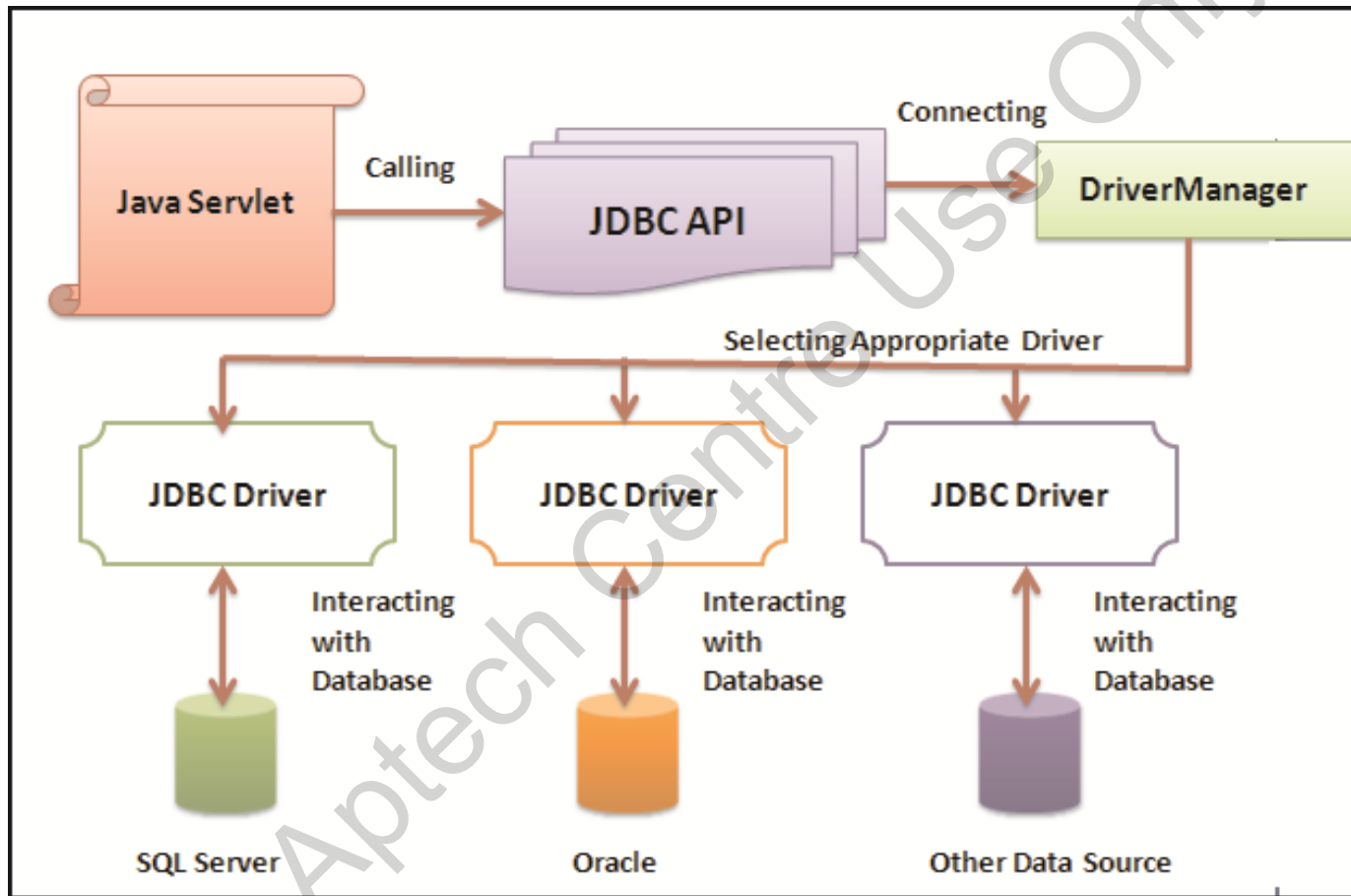
- Part of the Java SE platform.
- Enables a Web application to interact with a DBMS.

## Using Object Relational Mapping (ORM) API

- A persistence mechanism
- Helps in accessing relational databases.
- Maps the Java objects to database tables.

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# JDBC API



JDBC Architecture

# Enhancements in JDBC

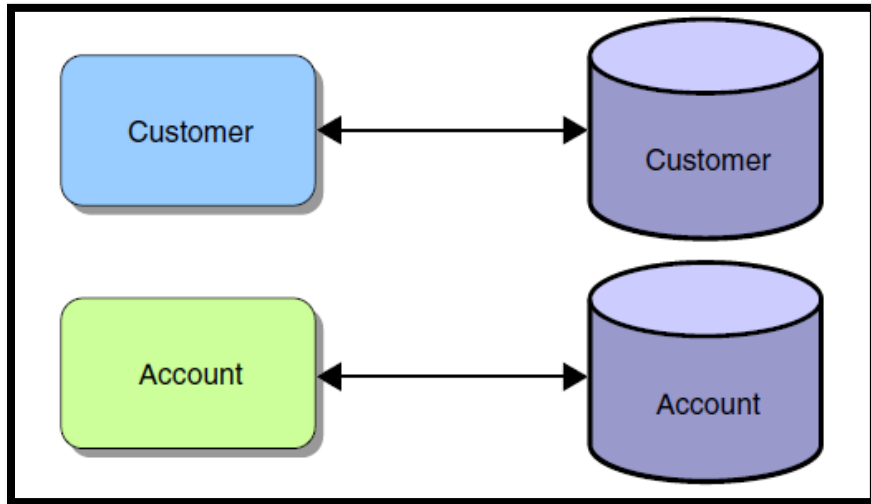
```
java.sql.connection.  
beginRequest()
```

Informs the driver that a request is  
about to start.

```
java.sql.connection.  
endRequest()
```

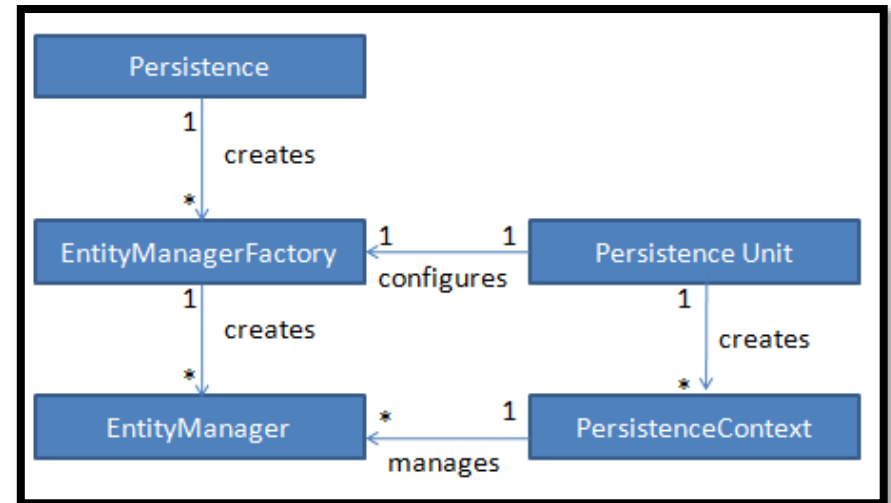
Informs the driver that a request is  
about to end.

# Java Persistence API (JPA)

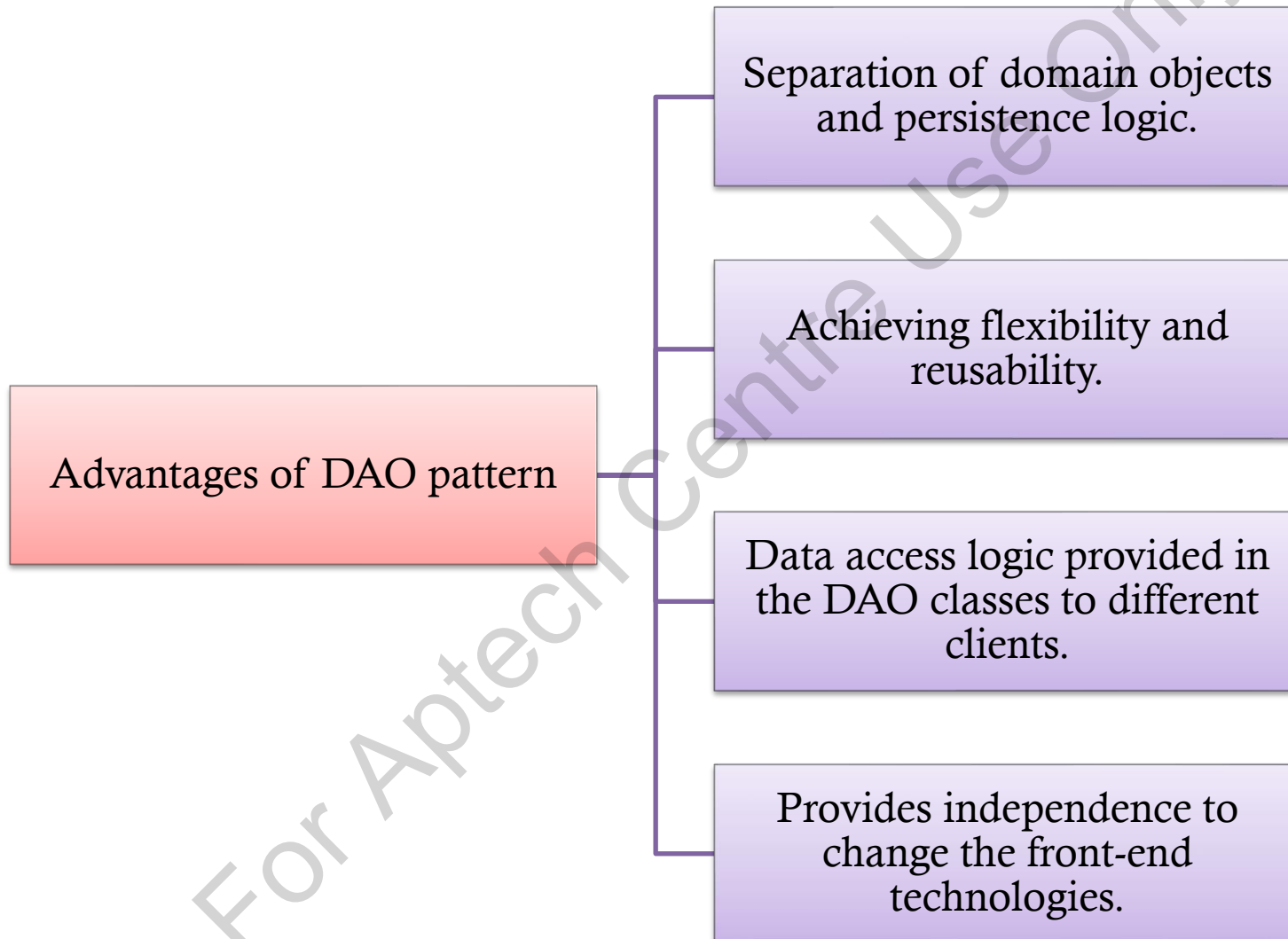


Mapping of Java Objects to Tables

Primary Components of JPA API



# DAO Pattern for Databases

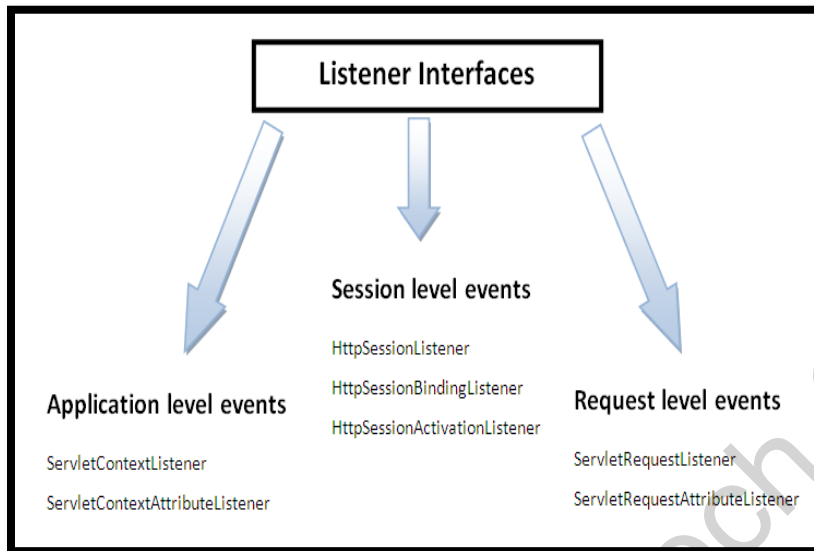


# JDBC versus JPA

JDBC	JPA
Database-dependent.	Database-independent.
Uses queries based on database.	Uses single query for different databases.
Development is slower.	Development and productivity is good.
Does not support POJO model.	Supports POJO model programming.
Java cache is required.	Uses two levels of cache for better performance.
Full SQL query is written to associate database tables.	Annotations are used to create associations.



# Session Event Handling



Listener Interfaces

`ServletContextListener`

`ServletContextEvent`

`ServletContextAttributeListener`

`ServletContextAttributeEvent`

`HttpSessionAttributeListener`

`HttpSessionBindingListener`

`HttpSessionBindingEvent`

`HttpSessionListener`

`HttpSessionActivationListene`

`HttpSessionEvent`

# Summary

- ❖ The most common operation performed by the Servlet is storing and retrieving database information.
- ❖ Java provides various mechanisms using which data can be accessed from the database using JDBC or JPA API.
- ❖ The JDBC API provides classes and interfaces that allow a Web application to access and perform operations on the databases.
- ❖ The JDBC 4.3 API is an improvement in JDBC API, it includes both the `java.sql` and `javax.sql` packages.
- ❖ JPA is an ORM technology that persist the entities in the database.
- ❖ Java annotations or XML are used to define the mapping of entity to existing database tables.
- ❖ In JPA, persistent objects are referred as Entities. Entities are plain old Java objects that are persisted to relational databases or legacy systems.
- ❖ A persistence context represents a set of managed entity instances that exist in a particular data store.
- ❖ The DAO pattern provides the easy maintenance of the applications by separating the business logics from the database access.
- ❖ The events in a servlet life cycle is monitored by defining listener objects. These objects methods get invoked when life cycle events occur.