Object-Relation Mapping

Hogeschool Rotterdam
Rotterdam, Netherlands

Introduction

Lecture topics

- Object-Relation Mapping.
- Setting up Postgres.
- Setting up hibernate.

Object-Relation Mapping

JDBC

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- It allows querying/updating database data
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  3. CallableStatement – used for executing stored procedures on the database.

```
..
try (Connection conn = DriverManager.getConnection(
                "jdbc:somejdbcvendor:other␣data␣needed
                    ␣by␣some␣jdbc␣vendor",
                "myLogin",
                "myPassword" ) ) {

          Statement stmt = conn.createStatement()
          stmt.executeUpdate( "INSERT␣INTO␣Ships(␣
              name␣)␣VALUE␣(␣'destroyer␣XYZ'␣)␣" );
          }
 }
..
```

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Disadvantages of JDBC

- Less maintainable code for large projects
- Queries are DBMS specific

Object-Relation Mapping

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- Performance: Object and query caching mechanism

Object-Relation Mapping

ORM and Data Persistence Pattern

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- Only two data persistence pattern will be discussed in this lecture

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  - Active record pattern
  - Data mapper

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- This object encapsulates the database access, and adds domain logic on that data
- So this object carries both data and behavior

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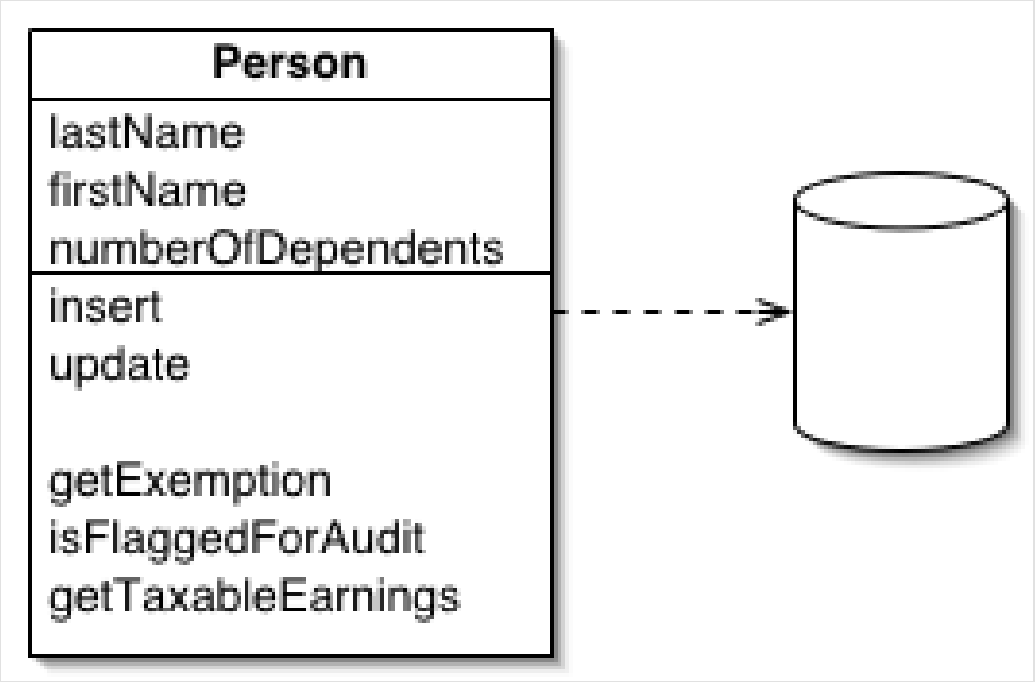
Active Record Pattern

- sample structure of active record



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Active Record Pattern (ARP)

- What are the limitations of this pattern regarding objects structure?

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Active Record Pattern (ARP)

- What are the limitations of this pattern regarding objects structure?
- Think of collections and inheritance!

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Data Mapper Pattern (DMP)

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- This layer keeps both in-memory objects and database independent from each others
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- The reasons for this are:
  - Objects and relational databases have different mechanisms for structuring data
  - Many parts of an object, such as collections and inheritance, aren't present in relational databases
  - Object schema and database schema do not match in many cases

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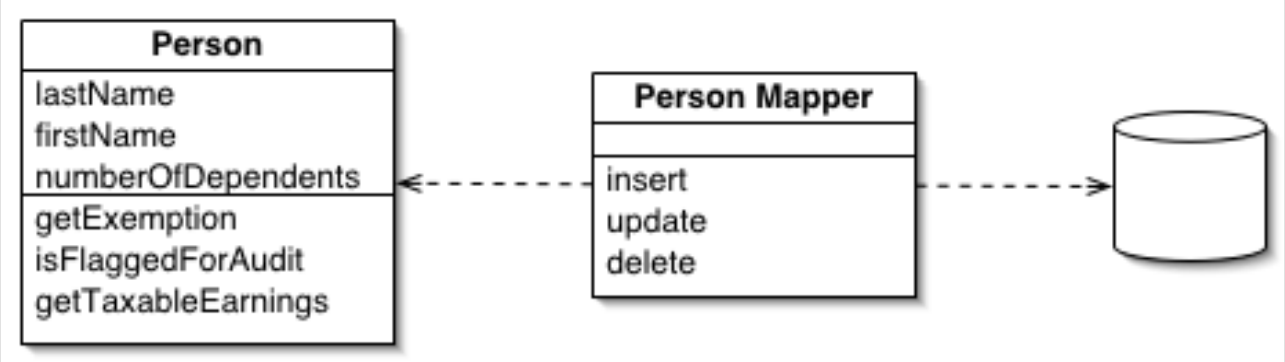
Data Mapper

- sample structure of data mapper



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Data Mapper Framework: Hibernate

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  - Configuration file for the settings: hibernate.cfg.xml

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  - Annotiation in the POJO-files (@keyword in java files)

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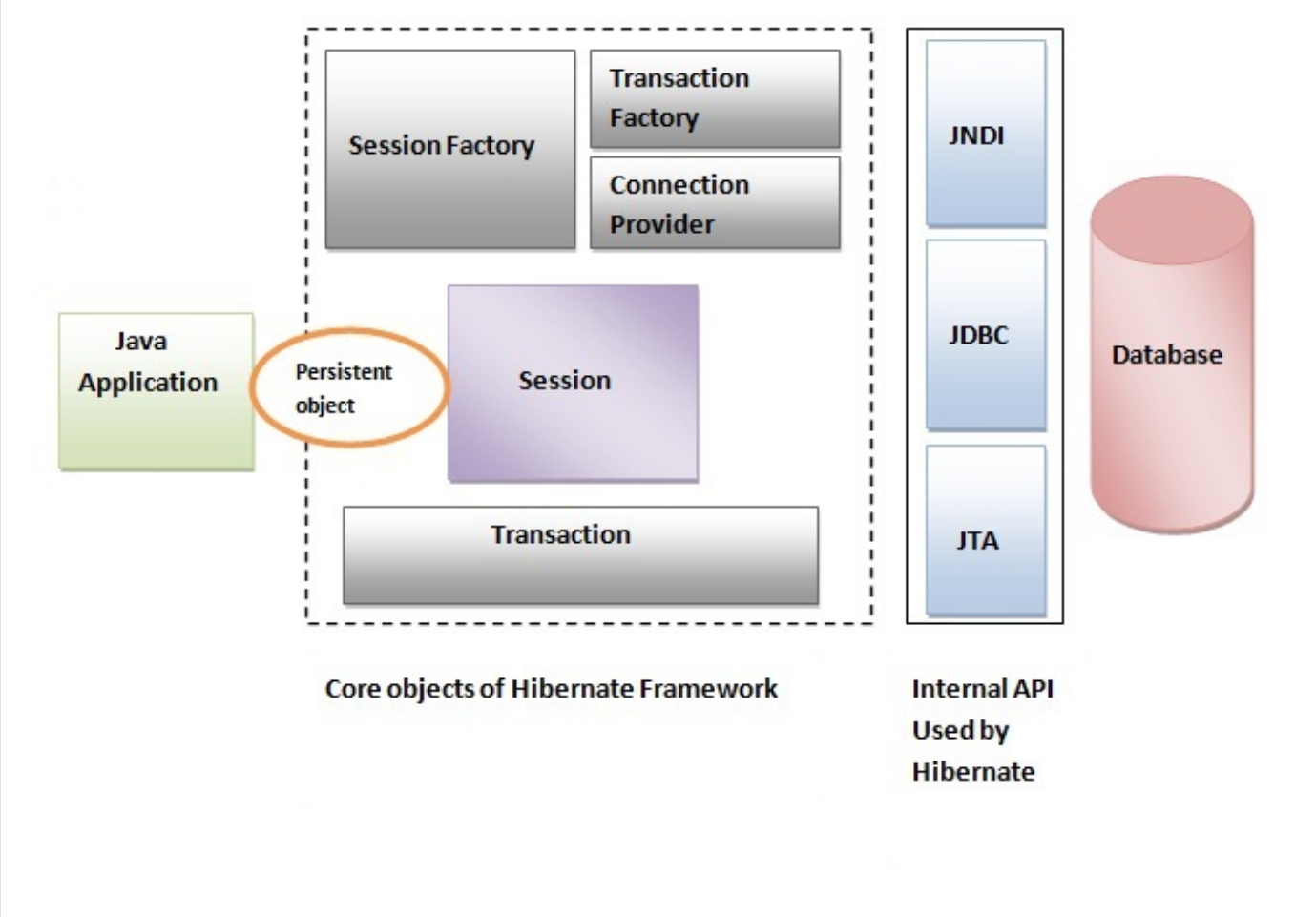
  - Configuration file for the settings: hibernate.cfg.xml
  - Mapping files for each entity: Entity.hbm.xml OR
  - Annotiation in the POJO-files (@keyword in java files)
  - Hibernate Query Language (HQL) is an object-oriented query language

Hibernate

- sample structure of data mapper



Example of Hibernate configuration file

```
<?xml version="1.0" encoding="utf-8"?>
<!DOCTYPE hibernate-configuration SYSTEM
"http://www.hibernate.org/dtd/hibernate-
    configuration-3.0.dtd">

<hibernate-configuration>
   <session-factory>
   <property name="hibernate.dialect">
      org.hibernate.dialect.PostgresSQLDialect
   </property>
   <property name="hibernate.connection.
       driver_class">
      com.postgres.jdbc.Driver
   </property>

   <!-- Assume test is the database name -->
   <property name="hibernate.connection.url">
      jdbc:mysql://localhost/test
   </property>
```

POJO sample for Ships

```
public class Ships {
    private int serial;
    private String name;
    private String armour;
    ...
  public Ships() {}
    ...
  }
```

Example of a mapping file in Hibernate

```
<?xml version="1.0" encoding="utf-8"?>
<!DOCTYPE hibernate-mapping PUBLIC
 "-//Hibernate/Hibernate␣Mapping␣DTD//EN"
 "http://www.hibernate.org/dtd/hibernate-mapping
     -3.0.dtd">

<hibernate-mapping>
   <class name="Ships" table="Ships">
      <meta attribute="class-description">
         This class contains the employee detail.
      </meta>
      <id name="serial" type="int" column="serial">
         <generator class="native"/>
      </id>
      <property name="serial" column="serial" type=
          "integer"/>
      <property name="name" column="name" type="
          string"/>
      <property name="armour" column="armour" type=
```

Example of using annotation instead of mapping files

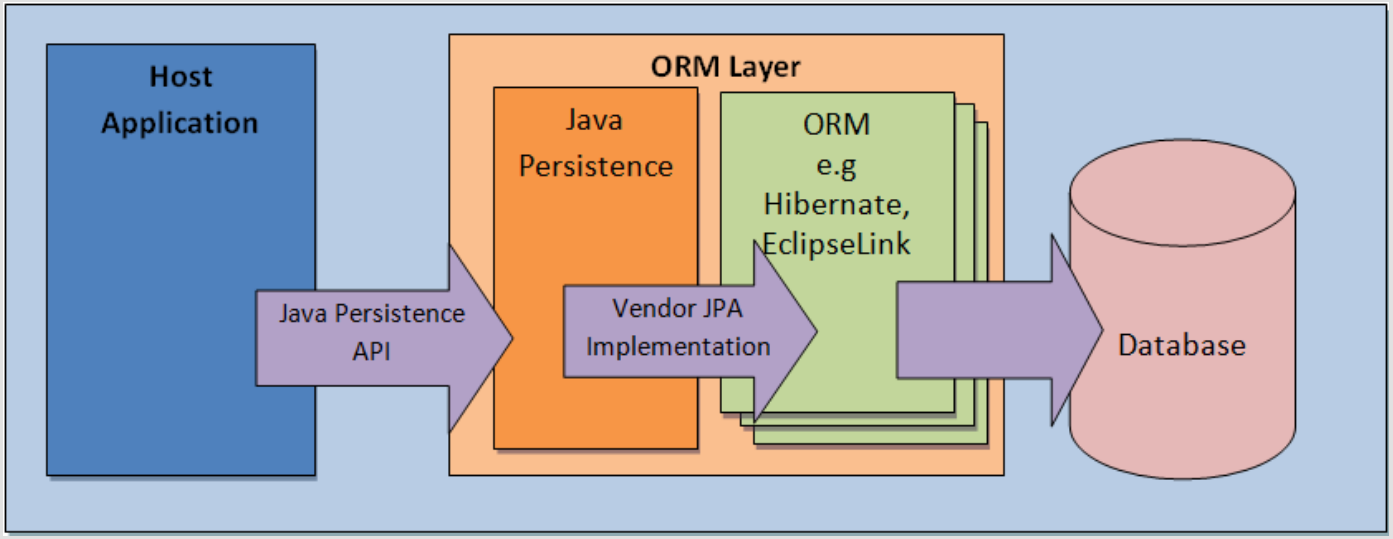
```
import javax.persistence.*;

@Entity
@Table(name = "ships")
public class Ships {
    @Id @GeneratedValue
    @Column(name = "serial")
    private int serial;

    @Column(name = "name")
    private String name;

    @Column(name = "armour")
    private String armour;

    public Employee() {}
```

Sample code for persisting a new ship in Hibernate

```
....
Session session = factory.openSession();
        Transaction tx = null;
        Integer shipId = null;
        try{
            tx = session.beginTransaction();
            Ships s = new Ships("walle","metal armour"
                );
            shipId = (Integer) session.save(Ships);
            tx.commit();
        }catch (HibernateException e) {
            if (tx!=null) tx.rollback();
            e.printStackTrace();
        }finally {
            session.close();
        }
....
```

Java Persistence API

- Provides the standard specification for managing the relational data in applications
- JPA is a layer between third party ORM like Hibernate and the application



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Java Persistence API

- Entities
- EntityManager
- Persistence Units
- JPA Query Language

Sample code for persisting a new ship in JPA with Hibernate

```
....
EntityManagerFactory emf = Persistence.
    createEntityManagerFactory("InfDev5PU");
//create a session in case of Hibernate
EntityManager em = emf.createEntityManager();
//starts a transaction
em.getTransaction().begin();
Ships s = new Ships("walle","metal armour");
//calls the save method of Hibernate
em.persist(em);
em.getTransaction().commit();
em.close();
....
```

Object-Relation Mapping

Lab

- Check the tables mentioned in les 0
- Create these tables in Postgres
- Insert new data into the database using Hibernate