JavaEE平台技术
MyBatis

邱明 博士

厦门大学信息学院

mingqiu@xmu.edu.cn

1 对象关系映射

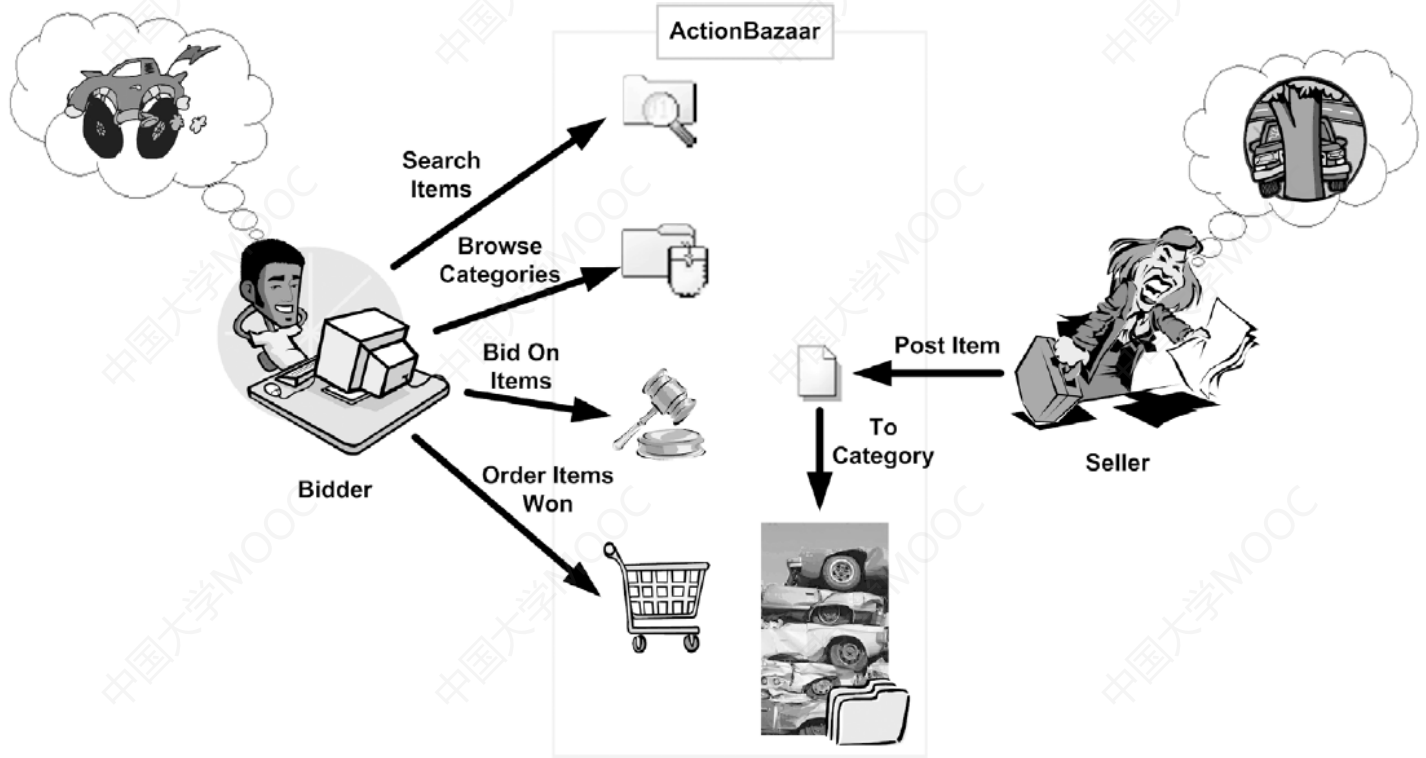


Figure 7.1 The core functionality of ActionBazaar. Sellers post items into searchable and navigable categories. Bidders bid on items and the highest bid wins.

1 对象关系映射

Figure 7.2
Entities are objects that can be persisted in the database. In the first step you identify entities—for example, entities in the ActionBazaar domain.

1 对象关系映射

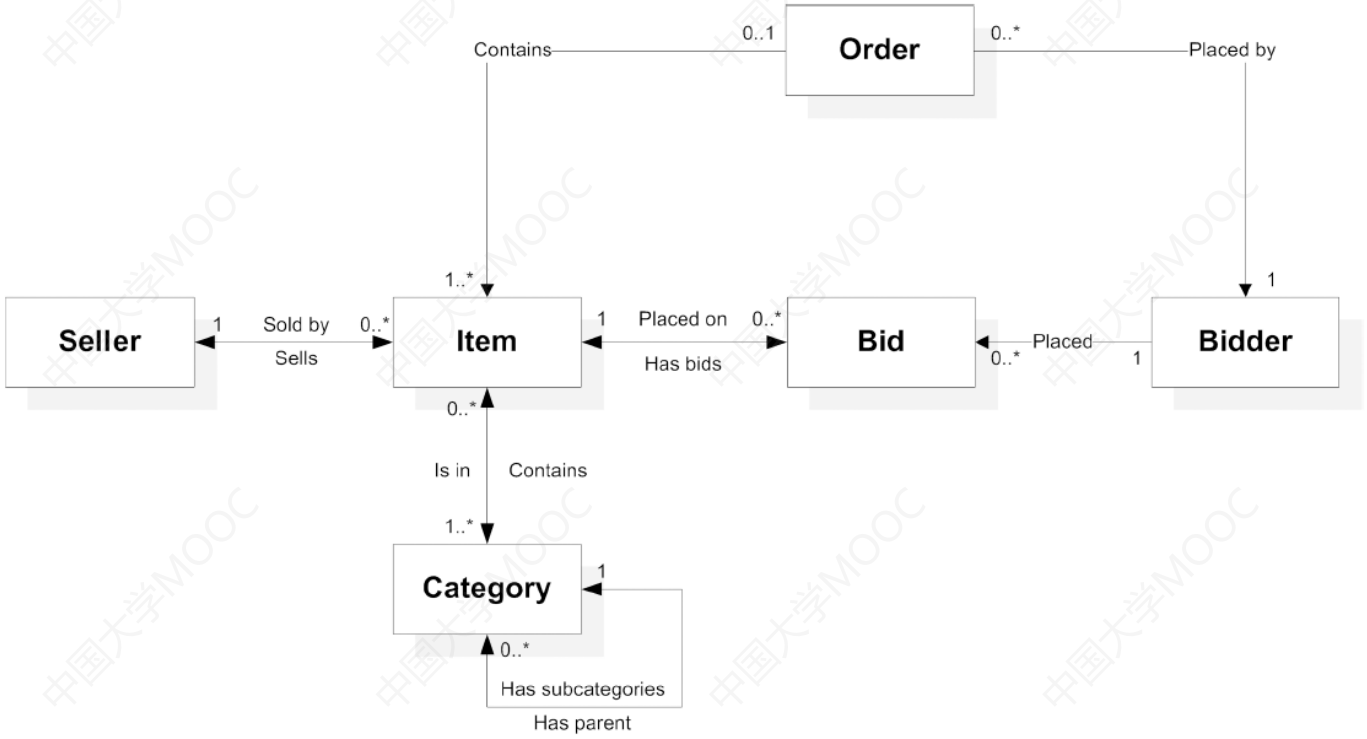
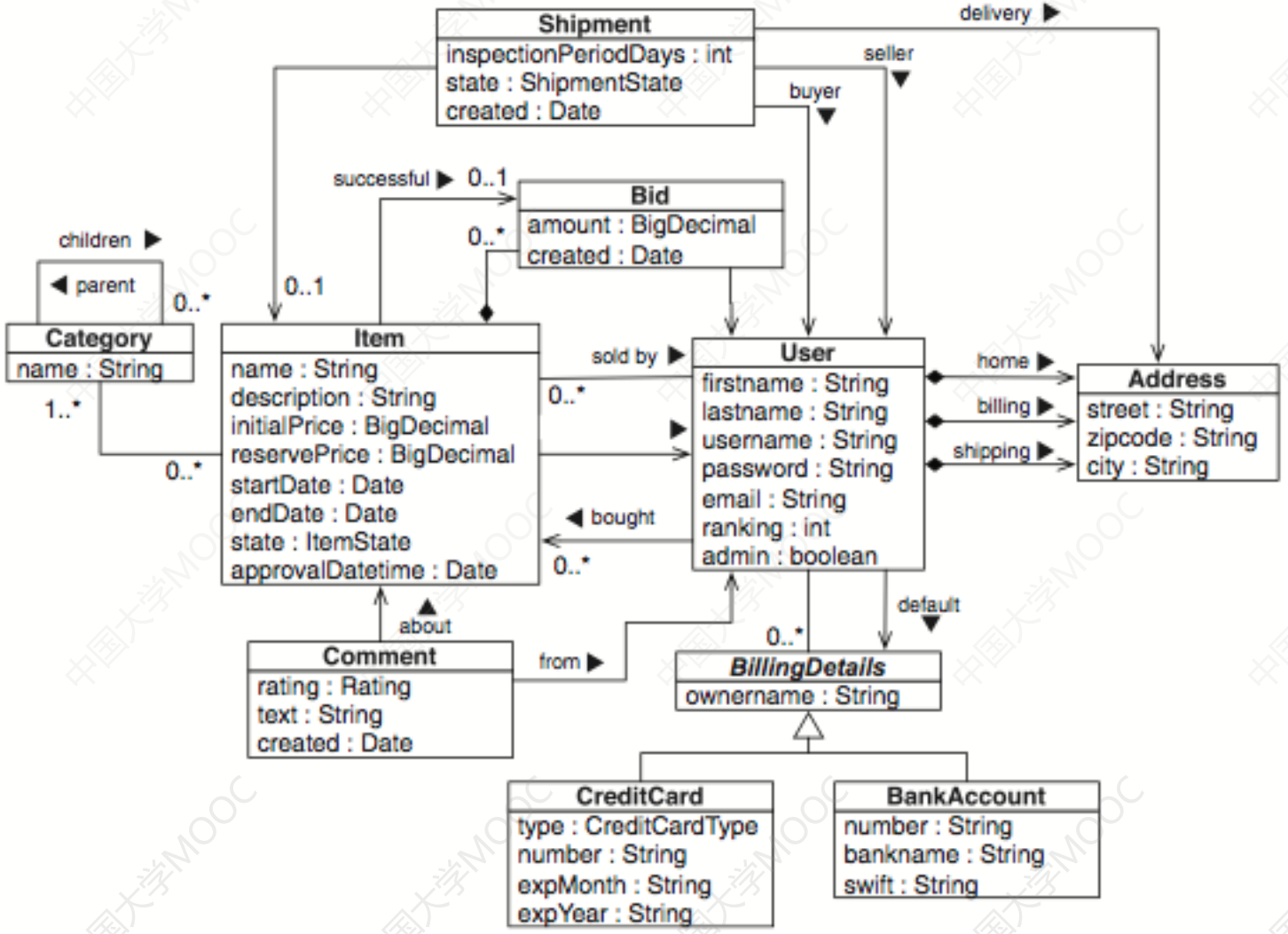


Figure 7.3 The ActionBazaar domain model complete with entities and relationships. Entities are related to one another and the relationship can be one-to-one, one-to-many, many-to-one, or many-to-many. Relationships can be either uni- or bidirectional.

1 对象关系映射


Shipment
inspectionPeriodDays : int
state : ShipmentState
created : Date
delivery
seller
buyer
successful
0..1
Bid
amount : BigDecimal
created : Date
0..*
children
parent
0..*
0..1
Category
name : String
Item
name : String
description : String
initialPrice : BigDecimal
reservePrice : BigDecimal
startDate : Date
endDate : Date
state : ItemState
approvalDatetime : Date
sold by
0..*
User
firstname : String
lastname : String
username : String
password : String
email : String
ranking : int
admin : boolean
home
billing
shipping
Address
street : String
zipcode : String
city : String
1..*
0..*
bought
0..*
about
Comment
rating : Rating
text : String
created : Date
from
default
0..*
BillingDetails
ownername : String
CreditCard
type : CreditCardType
number : String
expMonth : String
expYear : String
BankAccount
number : String
bankname : String
swift : String

1 对象关系映射

- 两种对象关系框架
  - Hibernate基本上可以自动生成。其对数据库结构 的封装
    - 开发效率上Hibernate 比较快。
    - Hibernate自动生成的sql效果不理想
  - MyBatis是一个半自动化的对象-关系模型持久化
    - 采用XML和标注把数据库记录映射成为Java对象，把J 吉果处理代码从工程中移除。
    - MyBatis框架是以sql的开发方式，可以进行细粒度的优

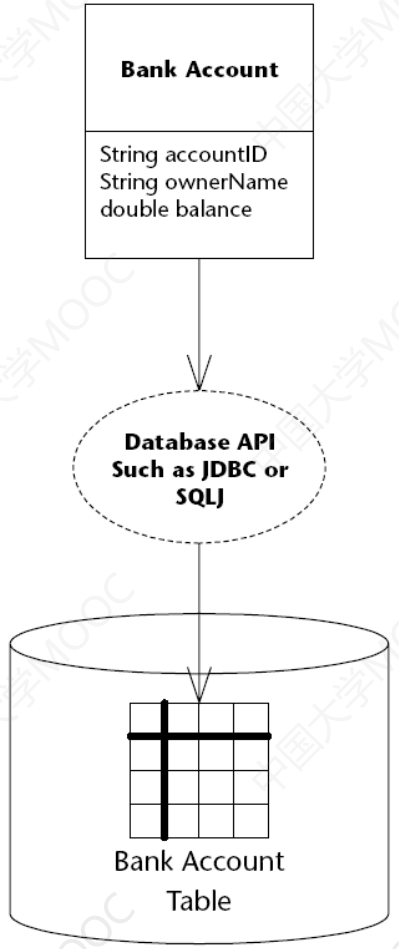


Figure 6.1 Object-relational mapping.

1 对象关系映射

面向对象模型	关系模型
类	表
对象	记录
属性	列
对象ID	主键
关联关系	外键
继承关系	不支持
方法	不支持

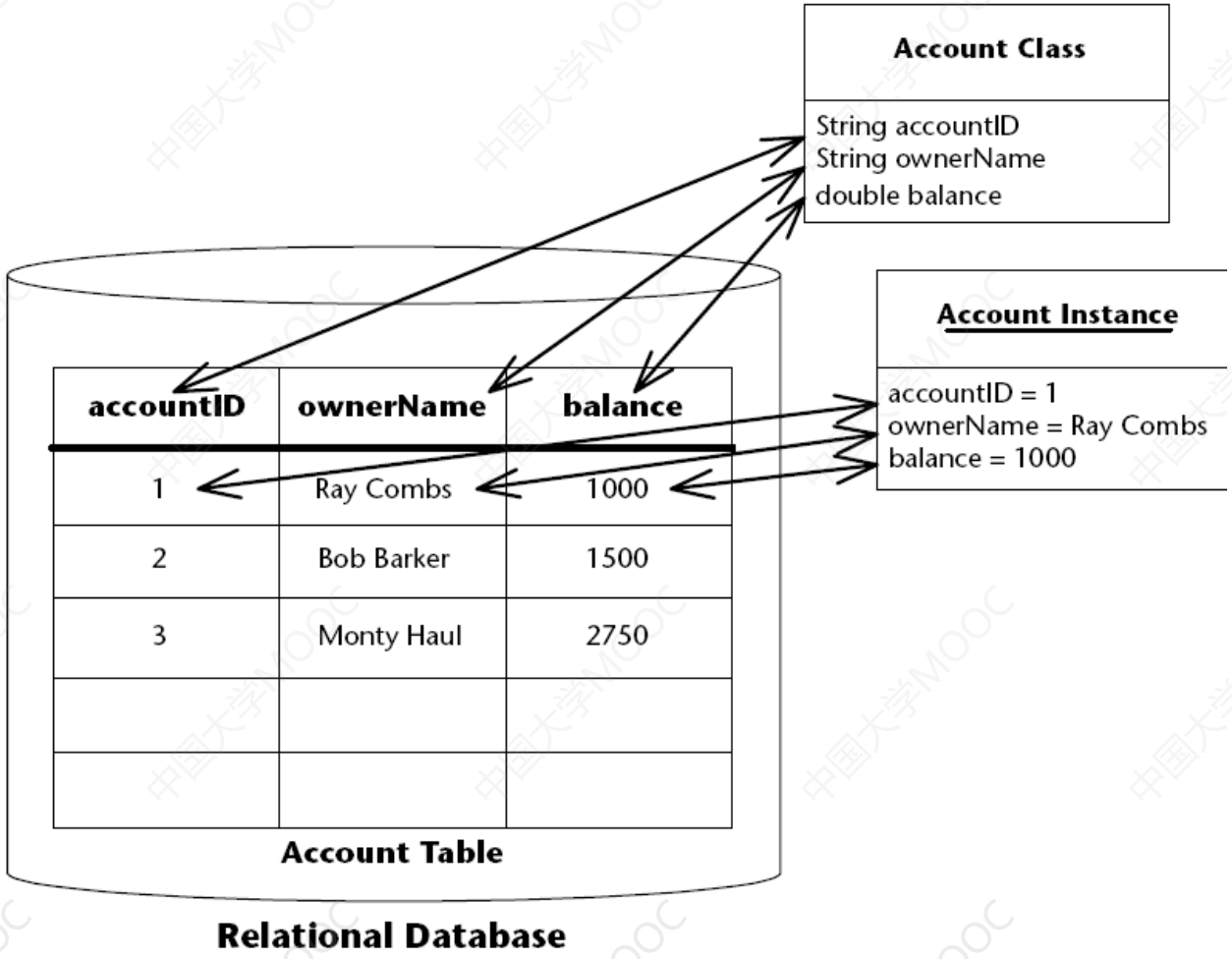


Figure 6.2 An example of object-relational mapping.

1 对象关系映射

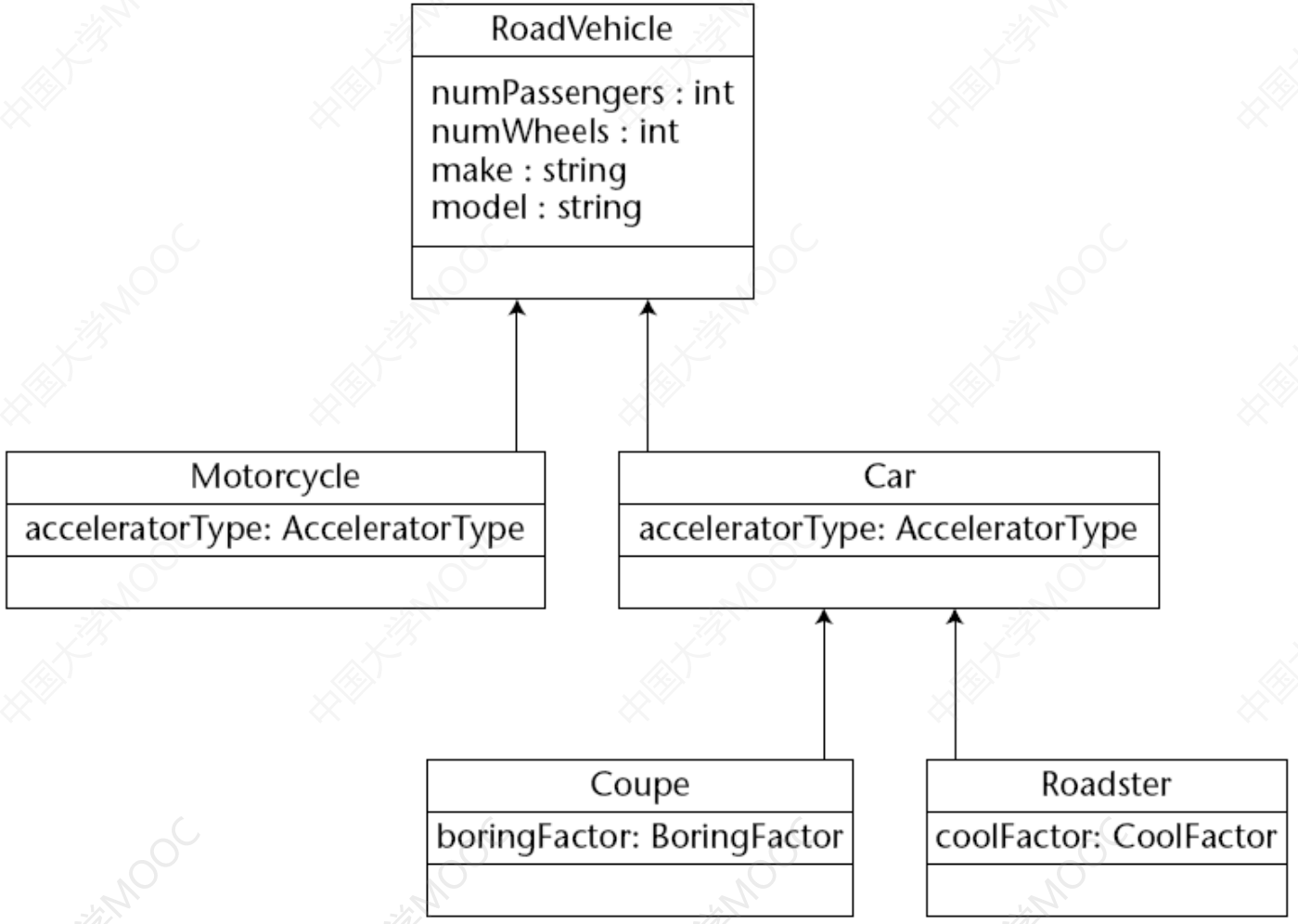


Figure 9.1 UML object model.

1 对象关系映射

- 两种映射策略
  - 用一张表来记录所有具有继承关系的类。

Table 9.1 Persisted Data

ID	DISC	MAKE	MODEL	COOL FACTOR	BORINGFACTOR
1818876882	COUPE	Bob	E400	NULL	0
1673414469	MOTORCYCLE	NULL	NULL	2	NULL
1673657791	ROADSTER	Mini	Cooper S	NULL	NULL

1 对象关系映射

- 两种映射策略
  - 针对每一个类一张表。

Table 9.2 ROADVEHICLEJOINED Table

ID	DTYPE	NUMWHEELS	MAKE	MODEL
1423656697	Coupe	4	Bob	E400
1425368051	Motorcycle	2	NULL	NULL
1424968207	Roadster	4	Mini	Cooper S

Table 9.3 MOTORCYCLE Table

ID	ACCELERATORTYPE
1425368051	1

1 对象关系映射

- 两种映射策略
  - 针对每一个类一张表。

Table 9.4 CAR Table

ID	ACCELERATORTYPE
1423656697	0
1424968207	0

Table 9.5 COUPE Table

ID	BORINGFACTOR
1423656697	0

Table 9.6 ROADSTER Table

ID	COOLFACTOR
1423656697	2

1 对象关系映射

- 一对一的关联关系

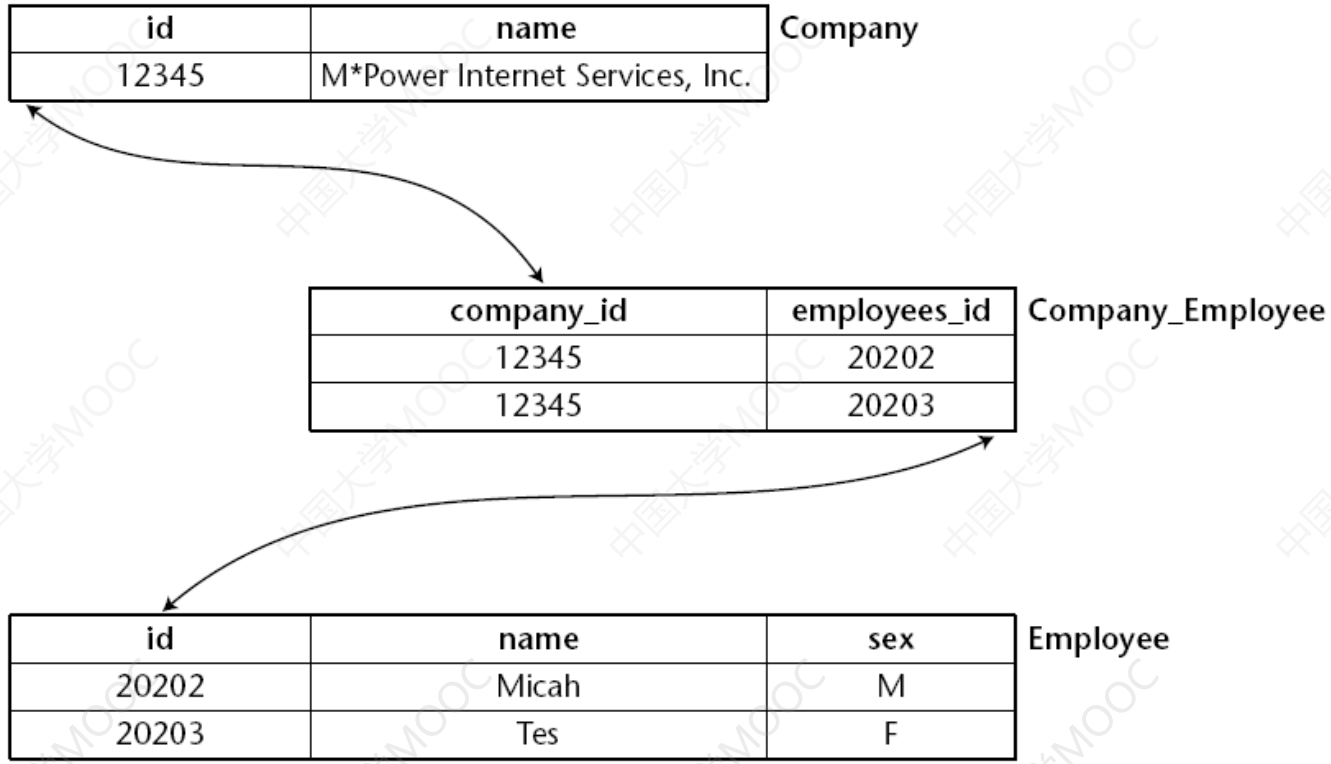
OrderPK	OrderName	Shipment ForeignPK
12345	Software Order	10101

ShipmentPK	City	ZipCode
10101	Austin	78727

Figure 9.2 A possible one-to-one database schema.

1 对象关系映射

- 一对多的关联关系



id	name	
12345	M*Power Internet Services, Inc.	Company

company_id	employees_id	
12345	20202	Company_Employee
12345	20203	

id	name	sex	
20202	Micah	M	Employee
20203	Tes	F	

Figure 9.3 Unidirectional one-to-many relationship with join table.

1 对象关系映射

- 一对多的关联关系

CompanyPK	Name
12345	The Middleware Company

EmployeePK	Name	Sex	Company
20202	Ed	M	12345
20203	Floyd	M	12345

Figure 9.4 A one-to-many database schema.

1 对象关系映射

- 多对多的关联关系

StudentPK	StudentName
10101	Joe Student

EnrollmentPK	StudentPK	CoursePK
12345	10101	20202

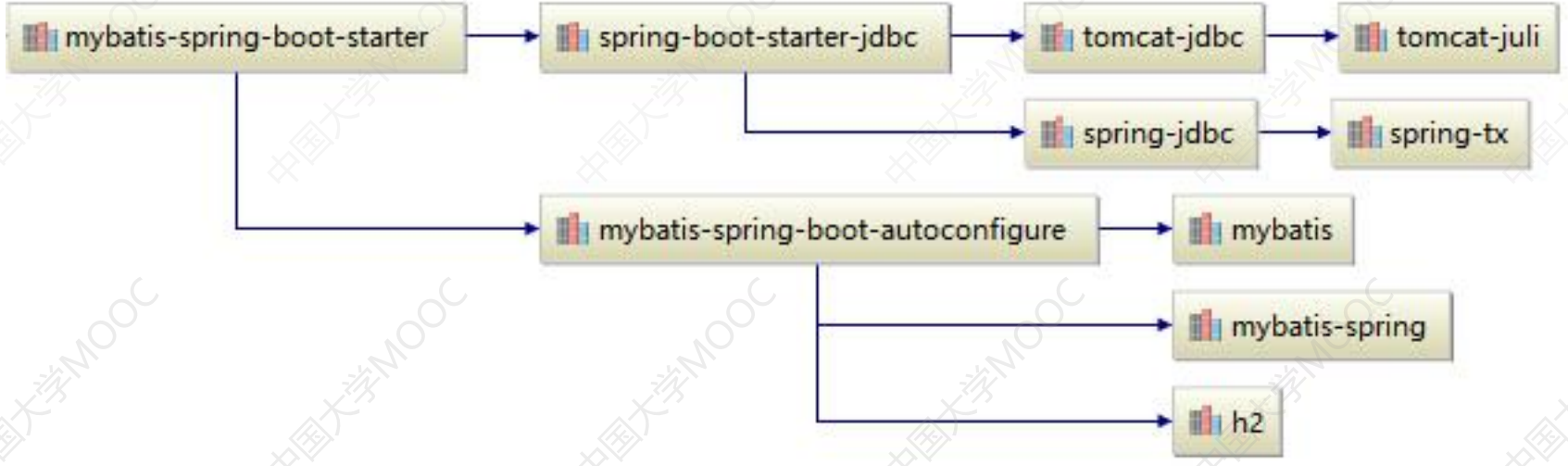
CoursePK	CourseName
20202	EJB for Architects

Figure 9.5 A possible many-to-many database schema.

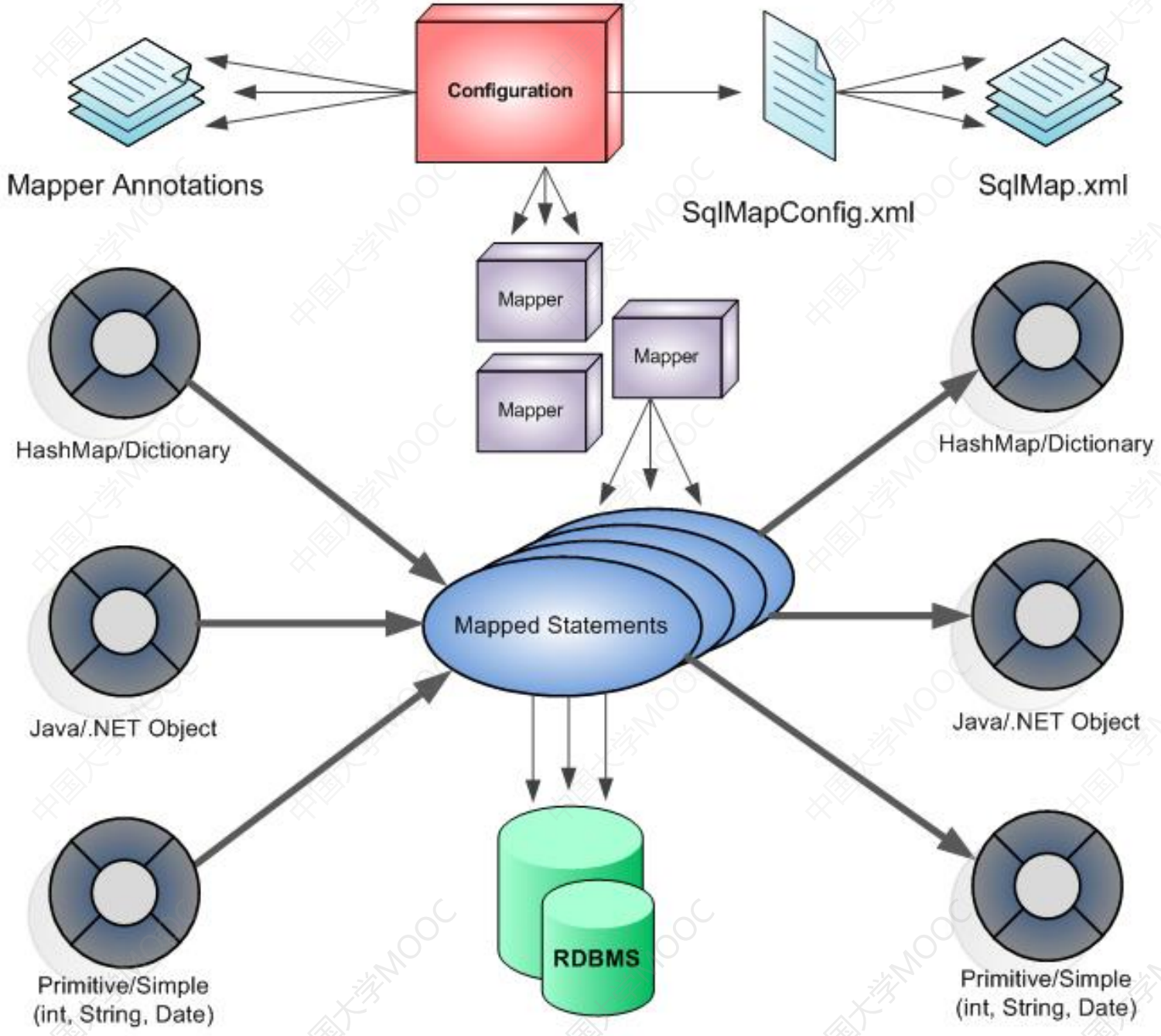
2 MyBatis结构

- Maven安装包

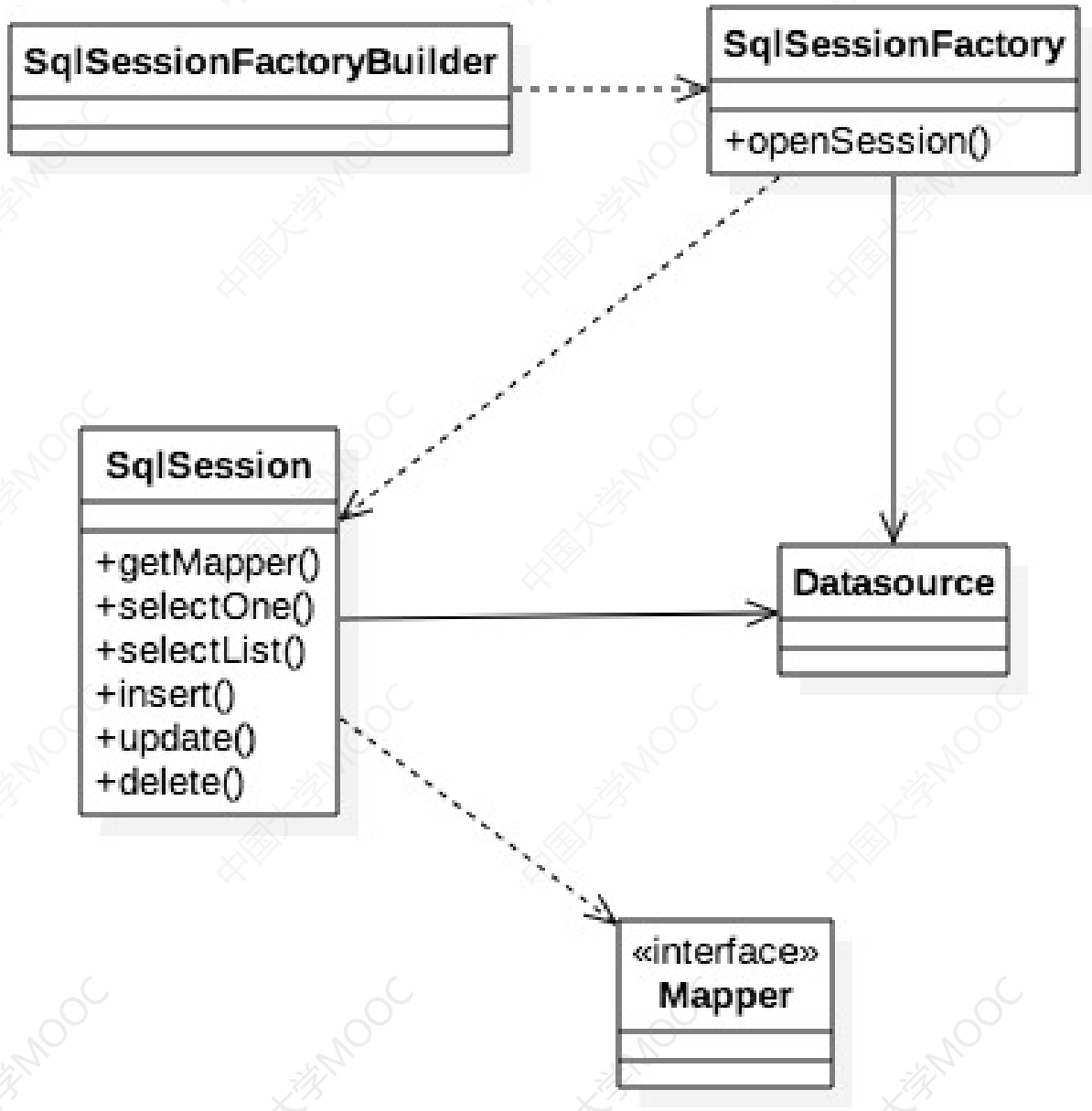
```
<dependency>
        <groupId>org.mybatis.spring.boot</groupId>
        <artifactId>mybatis-spring-boot-starter</artifactId>
</dependency>
```



2 MyBatis结构


Configuration
Mapper Annotations
SqlMapConfig.xml
SqlMap.xml
Mapper
Mapper
Mapper
HashMap/Dictionary
HashMap/Dictionary
Mapped Statements
Java/.NET Object
Java/.NET Object
RDBMS
Primitive/Simple
(int, String, Date)
Primitive/Simple
(int, String, Date)

2 MyBatis结构


SqlSessionFactoryBuilder
SqlSessionFactory
+openSession()
SqlSession
+getMapper()
+selectOne()
+selectList()
+insert()
+update()
+delete()
Datasource
«interface»
Mapper

2 MyBatis结构

- MyBatis-Spring-Boot-Starter
  - 自动识别已存在的DataSource
  - 创建并登记一个SqlSessionFactory的对象
  - 用SqlSessionFactory创建并登记一个SqlSessionTemplate的对象
  - 自动扫描并创建Mapper对象，将它们与SqlSessionTemplate对象关联，并登记到Spring上下文中，以备将来注入Bean中

2 MyBatis结构

```
@Mapper
public interface GoodsMapper {
    /**
     * 用GoodsPo对象找，
    * @param goodsPo 条件对象，所有条件为AND，仅有索引的值可以作为条件
    * @return  GoodsPo对象列表
    */
    List<GoodsPo> findGoods(GoodsPo goodsPo);

    /**
     * 用GoodsPo对象找，带Product对象返回
    * @param goodsPo 条件对象，所有条件为AND，仅有索引的值可以作为条件
    * @return  GoodsPo对象列表
    */
    List<GoodsPo> findGoodsWithProduct(GoodsPo goodsPo);
```

2 MyBatis结构

```
<select id="findGoods" parameterType="GoodsPo" resultType="GoodsPo">
    SELECT
    <include refid="Goods_Column_List"/>
    FROM oomall_goods
    WHERE
    state != 2
    <if test="id!=null">and id = #{id} </if>
    <if test="goodsSn!=null and goodsSn!=''">and goods_sn = #{goodsSn} </if>
    <if test="name!=null and name!=''">and name = #{name} </if>
    <if test="categoryId!=null">and category_id = #{categoryId} </if>
    <if test="brandId!=null">and brand_id = #{brandId} </if>
    <if test="state!=null">and state = #{state} </if>
</select>
```

3. MyBatis的映射标记

- insert：用于映射INSERT SQL语句
- update：用于映射UPDATE SQL语句
- delete：用于映射DELETE SQL语句
- select：用于映射SELECT SQL语句
- resultMap：用于把数据库的结果集映射成对象
- sql: 可重用的SQL代码片段

3. MyBatis的映射标记

- select

```
<select id="selectPerson" parameterType="int" resultType=”Person">
    SELECT * FROM PERSON WHERE ID = #{id}
</select>
```

3. MyBatis的映射标记

- Insert, update, delete

```
<insert id="insertAuthor" useGeneratedKeys="true" keyProperty="id">
      insert into Author (username,password,email,bio) values
(#{username},#{password},#{email},#{bio})
 </insert>

<update id="updateAuthor">
      update Author set username = #{username}, password = #{password}, email = #{email}, bio
= #{bio} where id = #{id}
</update>

<delete id="deleteAuthor"> delete from Author where id = #{id} </delete>
```

3. MyBatis的映射标记

- Sql
  - 用来定义可重用的 SQL 代码段，这些 SQL 代码可以被包含在其他语句中。它可以（在加载的时候）被静态地设置参数。 在不同的包含语句中可以设置不同的值到参数占位符上

```
<sql id="sometable"> ${prefix}Table </sql>

<sql id="someinclude">
    from
    <include refid="${include_target}"/>
</sql>

<select id="select" resultType="map">
        select field1, field2, field3
        <include refid="someinclude">
                <property name="prefix" value="Some"/>
                <property name="include_target" value="sometable"/>
        </include>
</select>
```

3. MyBatis的映射标记

- Parameter
  - 用#{}来表示SQL中的参数

```
<select id="selectUsers" resultType="User">
        select id, username, password from users where id = #{id} </select>


<insert id="insertUser" parameterType="User">
        insert into users (id, username, password) values (#{id}, #{username}, #{password})
 </insert>
```

3. MyBatis的映射标记

- ResultMap
  - MyBatis 会自动创建一个 ResultMap，基于属性名来映射记录的列到 JavaBean 的属性上。

```
<!-- In Config XML file -->
<typeAlias type="com.someapp.model.User" alias="User"/>

<!-- In SQL Mapping XML file -->
<select id="selectUsers" resultType="User">
        select id, username, hashedPassword from some_table where id = #{id}
</select>
```

3. MyBatis的映射标记

- ResultMap
  - 列名和属性名没有精确匹配，可以在 SELECT 语句中对列使用别名来匹配对象属性

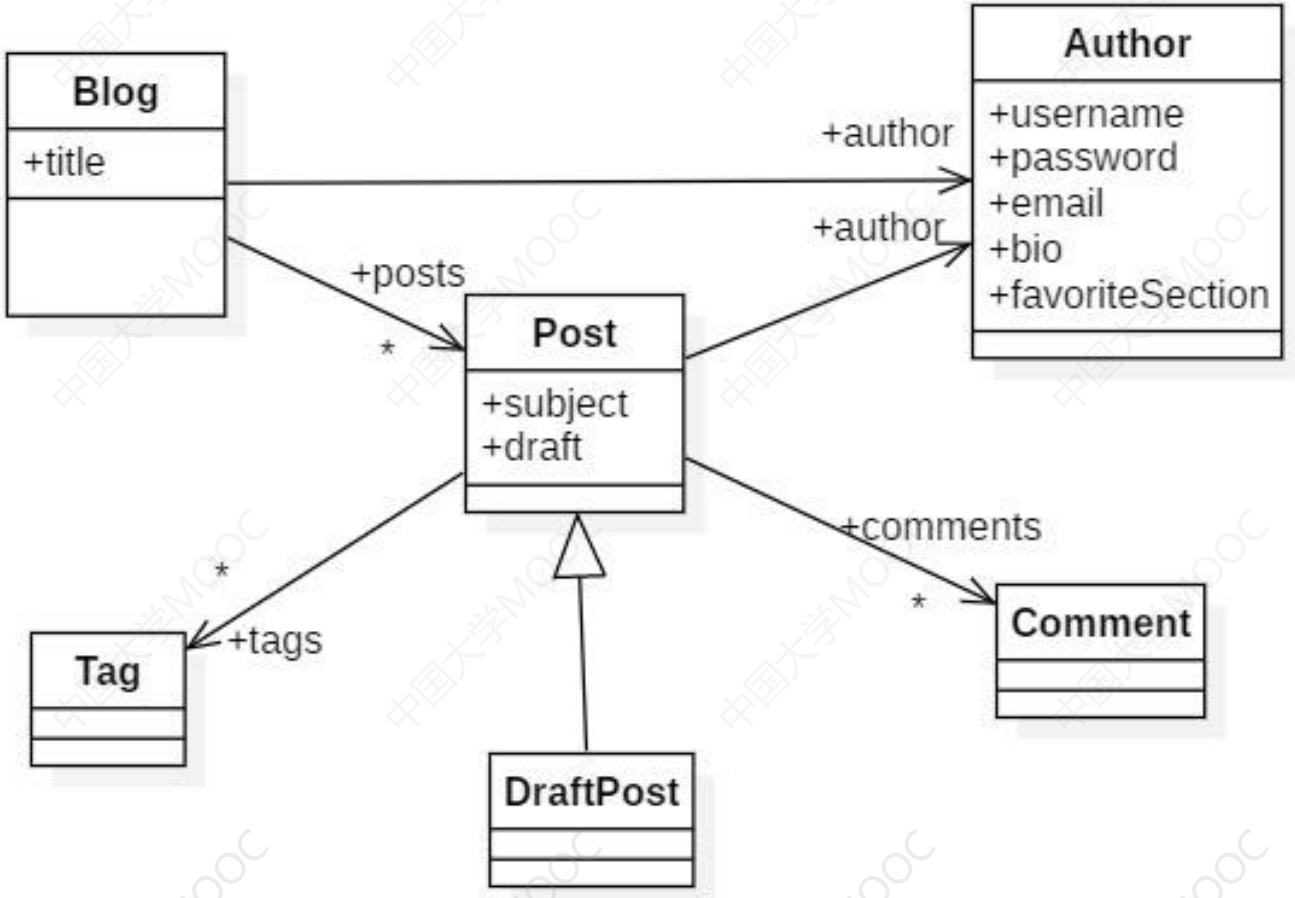
```
<select id="selectUsers" resultType="User">
        select user_id as "id",
                user_name as "userName",
                hashed_password as "hashedPassword"
        from some_table where id = #{id}
</select>
```

3. MyBatis的映射标记

- ResultMap
  - 当然也可以使用ResultMap

```
<resultMap id="userResultMap" type="User">
        <id property="id" column="user_id" />
        <result property="username" column="user_name"/>
        <result property="password" column="hashed_password"/>
</resultMap>
```

3. MyBatis的映射标记



```
<!-- Very Complex Result Map -->
<resultMap id="detailedBlogResultMap" type="Blog">
        <constructor>
                <idArg column="blog_id" javaType="int"/>
        </constructor>
        <result property="title" column="blog_title"/>
        <association property="author" javaType="Author">
                <id property="id" column="author_id"/>
                <result property="username" column="author_username"/>
                <result property="password" column="author_password"/>
                <result property="email" column="author_email"/>
                <result property="bio" column="author_bio"/>
                <result property="favouriteSection" column="author_favourite_section"/>
        </association>
        <collection property="posts" ofType="Post">
                <id property="id" column="post_id"/>
                <result property="subject" column="post_subject"/>
                <association property="author" javaType="Author"/>
                <collection property="comments" ofType="Comment">
                        <id property="id" column="comment_id"/>
                </collection>
                <collection property="tags" ofType="Tag" >
                        <id property="id" column="tag_id"/>
                </collection>
                <discriminator javaType="int" column="draft">
                        <case value="1" resultType="DraftPost"/>
                </discriminator>
        </collection>
</resultMap>
```

3. MyBatis的映射标记

- ResultMap
  - 构造方法

```
public class User {
    //...
    public User(Integer id, String username, int age) {
        //...
    }
    //...
}
```

```
<constructor>
  <idArg column="id" javaType="int" name="id" />
  <arg column="age" javaType="_int" name="age" />
  <arg column="username" javaType="String" name="username" />
</constructor>
```

3. MyBatis的映射标记

- ResultMap
  - 关联

```
<resultMap id="blogResult" type="Blog">
   <association property="author" column="author_id" javaType="Author" select="selectAuthor"/>
</resultMap>

<select id="selectBlog" resultMap="blogResult">
   SELECT * FROM BLOG WHERE ID = #{id}
</select>

<select id="selectAuthor" resultType="Author">
  SELECT * FROM AUTHOR WHERE ID = #{id}
</select>
```

column	数据库中的列名，在使用复合主键的时候，可以使用 column="{prop1=col1,prop2=col2}" 来指定多个传递给嵌套 Select 查询语句的列名。这会使得 prop1 和 prop2 作为参数对象，被设置为对应嵌套 Select 语句的参数。
select	用于加载复杂类型属性的映射语句的 ID，它会从 column 属性指定的列中检索数据，作为参数传递给目标 select 语句。 在使用复合主键的时候，可以用 column="{prop1=col1,prop2=col2}" 来指定多个传递给嵌套 Select 查询语句的列名。这会使得 prop1 和 prop2 作为参数对象，被设置为对应嵌套 Select 语句的参数。
fetchType	可选的。有效值为 lazy 和 eager。 指定属性后，将在映射中忽略全局配置参数 lazyLoadingEnabled，使用属性的值。

3. MyBatis的映射标记

- ResultMap
  - 关联

```
<resultMap id="blogResult" type="Blog">
   <collection property="posts" javaType="ArrayList" column="id" ofType="Post" select="selectPostsForBlog"/>
</resultMap>

<select id="selectBlog" resultMap="blogResult">
    SELECT * FROM BLOG WHERE ID = #{id}
</select>

<select id="selectPostsForBlog" resultType="Post">
    SELECT * FROM POST WHERE BLOG_ID = #{id}
</select>
```

3. MyBatis的映射标记

- ResultMap
  - 鉴别器 – 用于生成继承关系的对象

```
<resultMap id="vehicleResult" type="Vehicle">
    <id property="id" column="id" />
    <result property="vin" column="vin"/>
    <result property="year" column="year"/>
    <result property="make" column="make"/>
    <result property="model" column="model"/>
    <result property="color" column="color"/>
    <discriminator javaType="int" column="vehicle_type">
        <case value="1" resultMap="carResult"/>
        <case value="2" resultMap="truckResult"/>
        <case value="3" resultMap="vanResult"/>
        <case value="4" resultMap="suvResult"/>
    </discriminator>
</resultMap>
```

3. MyBatis的映射标记

```
<resultMap id="vehicleResult" type="Vehicle">
  <id property="id" column="id" />
  <result property="vin" column="vin"/>
  <result property="year" column="year"/>
  <result property="make" column="make"/>
  <result property="model" column="model"/>
  <result property="color" column="color"/>
  <discriminator javaType="int" column="vehicle_type">
    <case value="1" resultType="carResult">
      <result property="doorCount" column="door_count" />
    </case>
    <case value="2" resultType="truckResult">
      <result property="boxSize" column="box_size" />
      <result property="extendedCab" column="extended_cab" />
    </case>
    <case value="3" resultType="vanResult">
      <result property="powerSlidingDoor" column="power_sliding_door" />
    </case>
    <case value="4" resultType="suvResult">
      <result property="allWheelDrive" column="all_wheel_drive" />
    </case>
  </discriminator>
</resultMap>
```

3. MyBatis的映射标记

- 动态SQL
  - if
  - choose (when, otherwise)
  - trim (where, set)
  - foreach

3. MyBatis的映射标记

- if

```
<select id="findActiveBlogWithTitleLike" resultType="Blog">
      SELECT * FROM BLOG WHERE state = ‘ACTIVE’
      <if test="title != null"> AND title like #{title} </if>
</select>
```

```
<select id="findActiveBlogLike" resultType="Blog">
      SELECT * FROM BLOG WHERE state = ‘ACTIVE’
      <if test="title != null"> AND title like #{title} </if>
      <if test="author != null and author.name != null">
            AND author_name like #{author.name}
       </if>
</select>
```

3. MyBatis的映射标记

- choose (when, otherwise)

```
<select id="findActiveBlogLike" resultType="Blog">
      SELECT * FROM BLOG WHERE state = ‘ACTIVE’
      <choose>
            <when test="title != null"> AND title like #{title} </when>
            <when test="author != null and author.name != null">
                  AND author_name like #{author.name}
            </when>
            <otherwise> AND featured = 1 </otherwise>
      </choose>
</select>
```

3. MyBatis的映射标记

- trim (where, set)

```
<select id="findActiveBlogLike" resultType="Blog">
        SELECT * FROM BLOG
        <trim prefix="WHERE" prefixOverrides="AND |OR ">
            <if test="state != null"> state = #{state} </if>
            <if test="title != null"> AND title like #{title} </if>
            <if test="author != null and author.name != null">
                AND author_name like #{author.name}
            </if>
        </trim>
</select>
```

3. MyBatis的映射标记

- trim (where, set)

```
<update id="updateAuthorIfNecessary">
    update Author
    <trim prefix="SET" suffixOverrides=",">
        <if test="username != null">username=#{username},</if>
        <if test="password != null">password=#{password},</if>
        <if test="email != null">email=#{email},</if>
        <if test="bio != null">bio=#{bio}</if>
    </trim>
    where id=#{id}
</update>
```

3. MyBatis的映射标记

- foreach

```
<select id="selectPostIn" resultType="domain.blog.Post">
        SELECT * FROM POST P WHERE ID in
            <foreach item="item" index="index" collection=“list" open="(" separator="," close=")">
                #{item}
            </foreach>
</select>
```

```
public List<Blog> selectPostIn(List<Integer> ids);
```

3. MyBatis的映射标记

- 配置信息（application.properties）

mapper-locations	Locations of Mapper xml config file.
type-aliases-package	Packages to search for type aliases. (Package delimiters are ",; \t\n")
type-handlers-package	Packages to search for type handlers. (Package delimiters are ",; \t\n")
executor-type	Executor type: SIMPLE, REUSE, BATCH.
configuration-properties	Externalized properties for MyBatis configuration. Specified properties can be used as placeholder on MyBatis config file and Mapper file. For detail see the MyBatis reference page
configuration	A MyBatis Configuration bean. About available properties see the MyBatis reference page. This property cannot be used at the same time with the config-location.

4. MyBatis Generator

- 一个基于 MyBatis 的独立工具，
- 通过简单的配置去帮我们生成数据表所对应的 PO、Mapper和 XML 文件

```xml
<plugin>
    <groupId>org.mybatis.generator</groupId>
    <artifactId>mybatis-generator-maven-plugin</artifactId>
    <version>1.4.1</version>
    <configuration>
        <!--mybatis的代码生成器的配置文件-->
        <configurationFile>src/main/resources/mybatis-generator-config.xml</configurationFile>
        <!--允许覆盖生成的文件-->
        <overwrite>true</overwrite>
        <!--将当前pom的依赖项添加到生成器的类路径中-->
        <includeCompileDependencies>true</includeCompileDependencies>
    </configuration>
    <dependencies>
        <dependency>
            <groupId>org.mybatis.generator</groupId>
            <artifactId>mybatis-generator-core</artifactId>
            <version>1.4.1</version>
        </dependency>
    </dependencies>
</plugin>
```

5. Spring的事务

- 事务（@Transaction）

属性	类型	描述
value	String	可选的限定描述符，指定使用的事务管理器
propagation	enum: Propagation	可选的事务传播行为设置
isolation	enum: Isolation	可选的事务隔离级别设置，只在REQUIRED和REQUIRES_NEW的事务中有效，默认为ISOLATION_DEFAULT，即数据库的默认的隔离级别
readOnly	boolean	读写或只读事务，默认读写
timeout	int (in seconds granularity)	事务超时时间设置
rollbackFor	Class对象数组，必须继承自Throwable	用于指定能够触发事务回滚的异常类型数组。
rollbackForClassName	类名数组，必须继承自Throwable	用于指定能够触发事务回滚的异常类名字数组
noRollbackFor	Class对象数组，必须继承自Throwable	不会导致事务回滚的异常类数组
noRollbackForClassName	类名数组，必须继承自Throwable	不会导致事务回滚的异常类名字数组

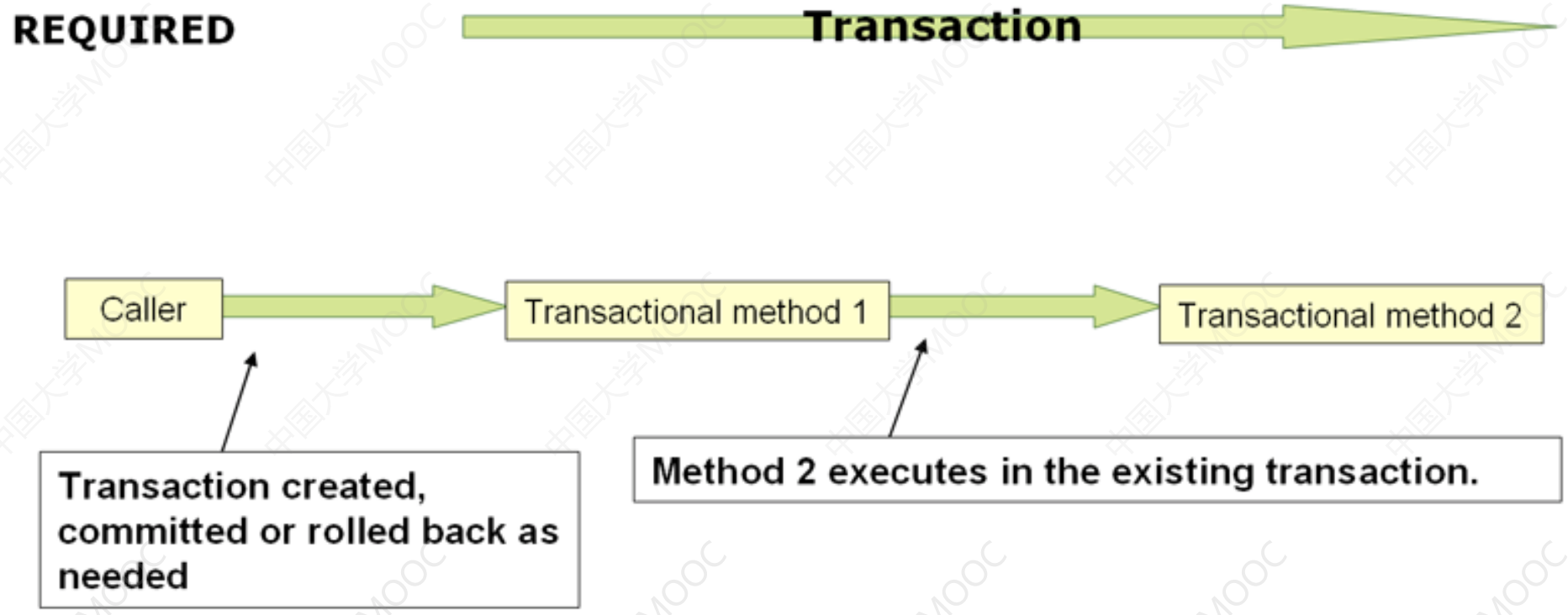
5. Spring的事务

- 事务传播设置（propagation）

传播设置	描述
Propagation.REQUIRED	如果当前没有事务，就创建一个新事务，如果当前存在事务，就加入该事务，该设置是默认设置。
Propagation.SUPPORTS	支持当前事务，如果当前存在事务，就加入该事务，如果当前不存在事务，就以非事务执行。
Propagation.MANDATORY	支持当前事务，如果当前存在事务，就加入该事务，如果当前不存在事务，就抛出异常。
Propagation.REQUIRES_NEW	创建新事务，无论当前存不存在事务，都创建新事务。
Propagation.NOT_SUPPORTED	以非事务方式执行操作，如果当前存在事务，就把当前事务挂起。
Propagation.NEVER	以非事务方式执行，如果当前存在事务，则抛出异常。
Propagation.NESTED	如果当前存在事务，则在嵌套事务内执行。如果当前没有事务，则执行与Propagation.REQUIRED类似的操作。

5. Spring的事务

- 事务传播设置（propagation）



5. Spring的事务

- 事务传播设置（propagation）