# JPA 系列课程

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## 目录

## 课程目标:

Hibernate 级联映射关系,懒加载,立即加载,控制反转
Hibernate 映射配置: Annotation, XML
Hibernate 优化:DDL 优化,DML 优化,DQL 优化
JAP 规则
Hibernate JPA 对 JPA 的实现
Spring Data JPA 对 JPA 规则的支持

# 初始 Hibernate

## 课程目标

### Hibernate 是什么

Hibernate 是一个开放源代码的对象关系映射框架，它对 JDBC 进行了非常轻量级的对象封装，使得 Java 程序员可以使用对象编程思维来操作数据库。

Hibernate 不仅提供了从对象类到数据表之间的映射，还提供了数据查询和恢复机制，相对于使用 JDBC 和 SQL 的手工来操作数据，使用 Hibernate 可以大大减少操作数据库的编程工作量

## Hibernate 发展史

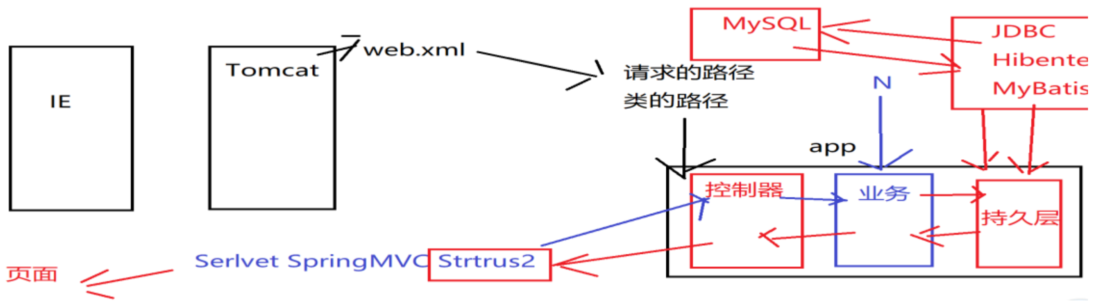
2001 年 11 月，澳大利亚墨尔本一位名为 Gavin King 的 27 岁的程序员发布了 Hibernate 第一个版本。

2003 年 9 月，Hibernate 开发团队进入 JBoss 公司，从这个时候开始 Hibernate 得到了突飞猛进的普及和发展。

2004 年，随着 Rod Johnson 的著作《Expert One-on-One J2EE Development without EJB》出版后，整个 Java 社区开始从实体 bean 向 Hibernate 转移。

2006 年，J2EE5.0 标准正式发布以后，持久化框架标准 Java Persistent API（简称 JPA）基本上是参考 Hibernate 实现的，而 Hibernate 在 3.2 版本开始，已经完全兼容 JPA 标准。

## Hibernate 的定位

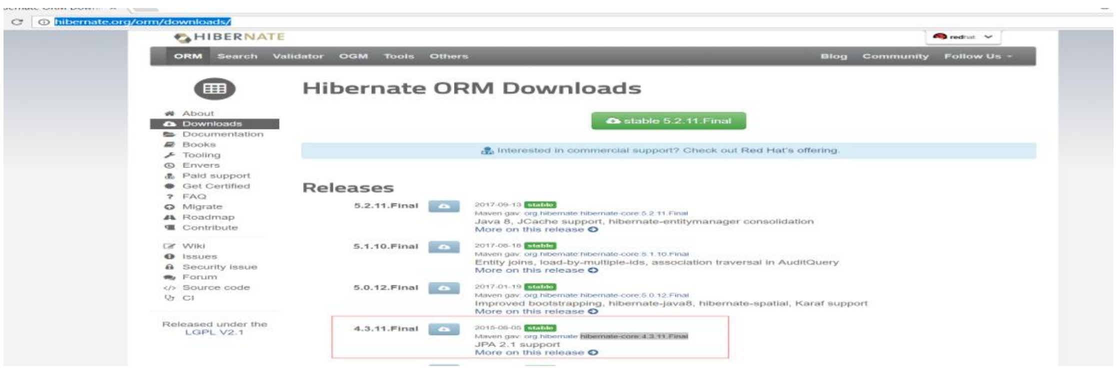


## Hibernate 获取

版本:hibernate-core:4.3.11.Final

网址:http://hibernate.org/orm/downloads/

网站截图:



Hibernate ORM Downloads

Interested in commercial support? Check out Red Hat's offering.

Releases

5.2.11.Final 2017-09-13 stable
Maven gav: org.hibernate:hibernate-core:5.2.11.Final
Java 8, JCache support, hibernate-entitymanager consolidation
More on this release

5.1.10.Final 2017-08-18 stable
Maven gav: org.hibernate:hibernate-core:5.1.10.Final
Entity joins, load-by-multiple-ids, association traversal in AuditQuery
More on this release

5.0.12.Final 2017-01-19 stable
Maven gav: org.hibernate:hibernate-core:5.0.12.Final
Improved bootstrapping, hibernate-java8, hibernate-spatial, Karaf support
More on this release

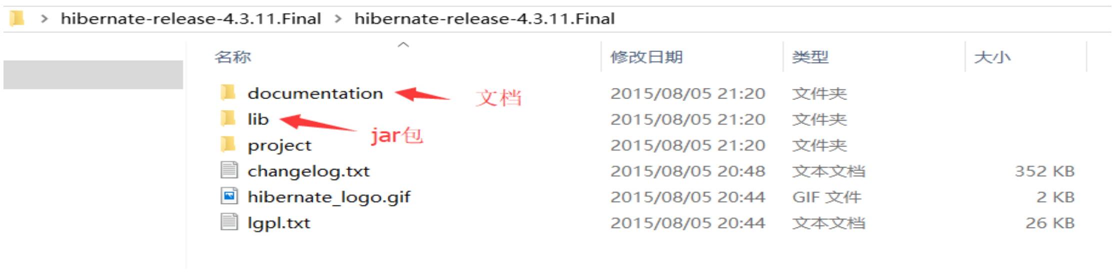
4.3.11.Final 2015-08-05 stable
Maven gav: org.hibernate:hibernate-core:4.3.11.Final
JPA 2.1 support
More on this release

Released under the LGPL V2.1

## Hibernate 目录/文档简介/快速入门

### Hibernate.cfg.xml

第一步:解压下载的 hibernate-core:4.3.11.Final

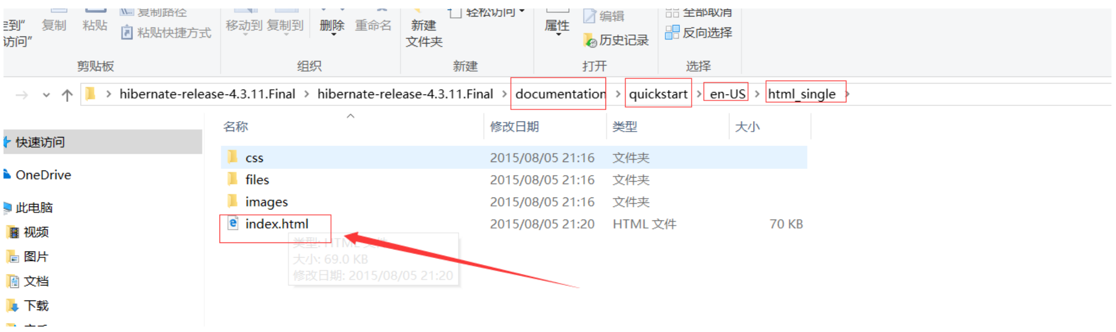


> hibernate-release-4.3.11.Final > hibernate-release-4.3.11.Final

| 名称 | 修改日期 | 类型 | 大小 |
|---|---|---|---|
| documentation | 2015/08/05 21:20 | 文件夹 | |
| lib | 2015/08/05 21:20 | 文件夹 | |
| project | 2015/08/05 21:20 | 文件夹 | |
| changelog.txt | 2015/08/05 20:48 | 文本文档 | 352 KB |
| hibernate_logo.gif | 2015/08/05 20:44 | GIF 文件 | 2 KB |
| lgpl.txt | 2015/08/05 20:44 | 文本文档 | 26 KB |

第二步:进入: html_single 目录

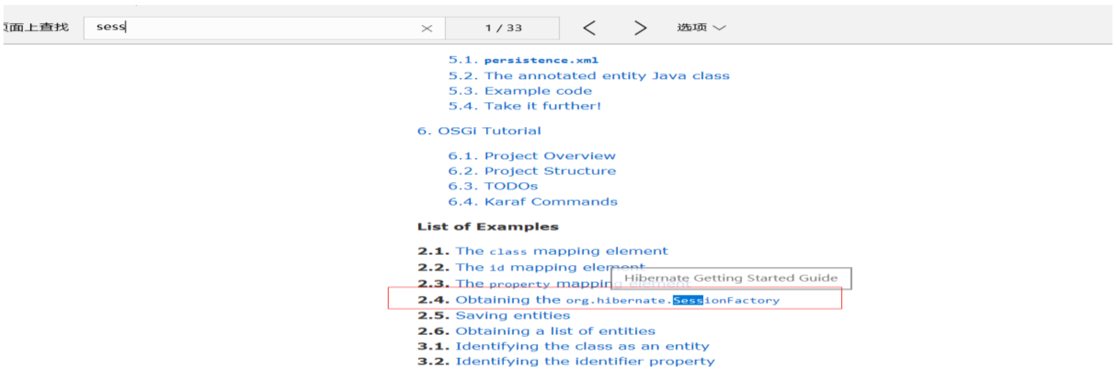
路径：\hibernate-release-4.3.11.Final\documentation\quickstart\en-US\html_single



hibernate-release-4.3.11.Final > hibernate-release-4.3.11.Final > documentation > quickstart > en-US > html_single

| 名称 | 修改日期 | 类型 | 大小 |
|---|---|---|---|
| css | 2015/08/05 21:16 | 文件夹 | |
| files | 2015/08/05 21:16 | 文件夹 | |
| images | 2015/08/05 21:16 | 文件夹 | |
| index.html | 2015/08/05 21:20 | HTML 文件 | 70 KB |

第三步:进入 index.html,全文检索 sessionFactory



5.1. persistence.xml
5.2. The annotated entity Java class
5.3. Example code
5.4. Take it further!

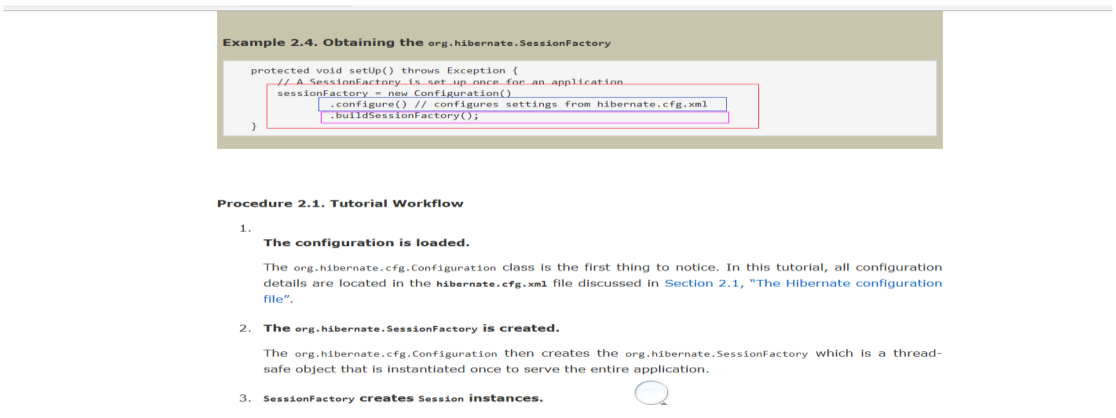
6. OSGi Tutorial

6.1. Project Overview
6.2. Project Structure
6.3. TODOs
6.4. Karaf Commands

**List of Examples**

2.1. The class mapping element
2.2. The id mapping element
2.3. The property mapping element
2.4. Obtaining the org.hibernate.SessionFactory
2.5. Saving entities
2.6. Obtaining a list of entities
3.1. Identifying the class as an entity
3.2. Identifying the identifier property

**第四步:单机 Obtaining the org.hibernate.SessionFactory 观察如下开启界面框选中的代码**



**Example 2.4. Obtaining the org.hibernate.SessionFactory**

```
protected void setUp() throws Exception {
    // A SessionFactory is set up once for an application
    sessionFactory = new Configuration()
            .configure() // configures settings from hibernate.cfg.xml
            .buildSessionFactory();
}
```

**Procedure 2.1. Tutorial Workflow**

1. **The configuration is loaded.**

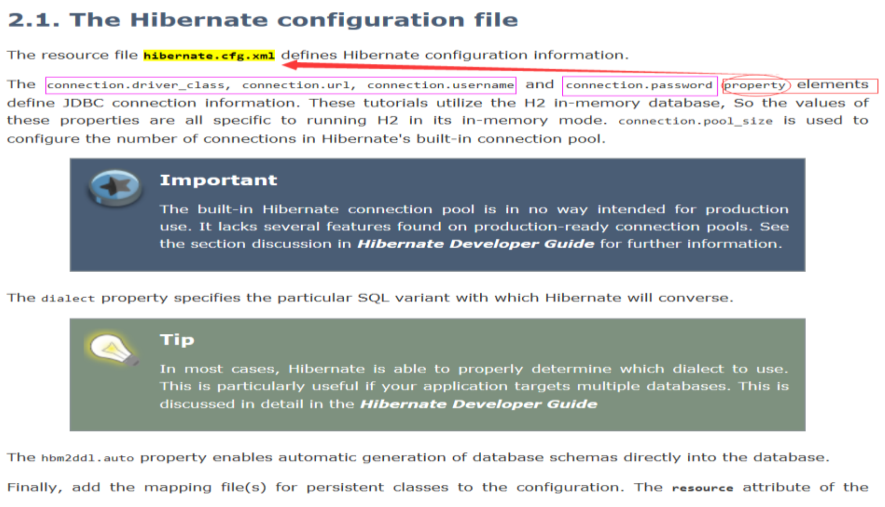
   The org.hibernate.cfg.Configuration class is the first thing to notice. In this tutorial, all configuration details are located in the **hibernate.cfg.xml** file discussed in Section 2.1, "The Hibernate configuration file".

2. **The org.hibernate.SessionFactory is created.**

   The org.hibernate.cfg.Configuration then creates the org.hibernate.SessionFactory which is a thread-safe object that is instantiated once to serve the entire application.

3. **SessionFactory creates Session instances.**

## 第五步:全文检索 **hibernate.cfg.xml** 观察如下开启界面框选中的说明



### 2.1. The Hibernate configuration file

The resource file `hibernate.cfg.xml` defines Hibernate configuration information.

The `connection.driver_class`, `connection.url`, `connection.username` and `connection.password` `property` elements define JDBC connection information. These tutorials utilize the H2 in-memory database, So the values of these properties are all specific to running H2 in its in-memory mode. `connection.pool_size` is used to configure the number of connections in Hibernate's built-in connection pool.

**Important**

The built-in Hibernate connection pool is in no way intended for production use. It lacks several features found on production-ready connection pools. See the section discussion in ***Hibernate Developer Guide*** for further information.

The `dialect` property specifies the particular SQL variant with which Hibernate will converse.

**Tip**

In most cases, Hibernate is able to properly determine which dialect to use. This is particularly useful if your application targets multiple databases. This is discussed in detail in the ***Hibernate Developer Guide***

The `hbm2ddl.auto` property enables automatic generation of database schemas directly into the database.

Finally, add the mapping file(s) for persistent classes to the configuration. The **`resource`** attribute of the

## 第六步:总结文档信息

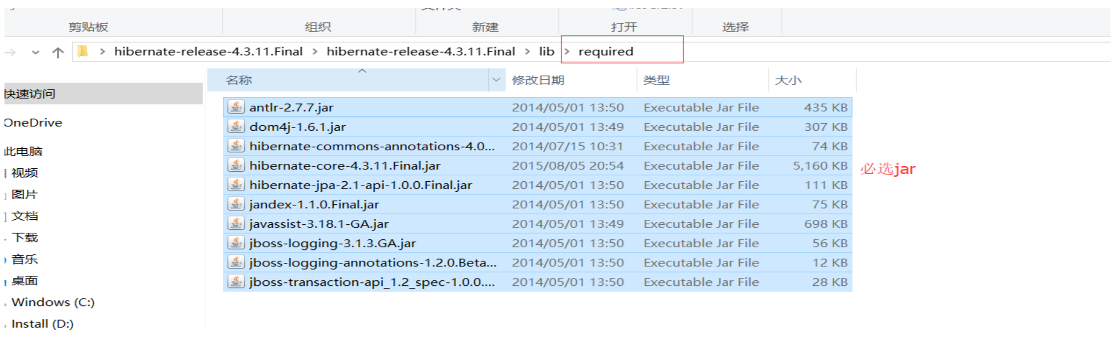
使用 **hibernate** 需要加载一个 **hibernate.cfg.xml** 文件才能构建出 sessionFactory

**hibernate.cfg.xml 需要配置属性(property)**

**hibernate.cfg.xml 属性包含**

| 属性 | 详细解释 |
|---|---|
| connection.url | 数据库连接字符串 |
| connection.driver_class | 驱动地址 |
| connection.username | 数据库连接账号 |
| connection.password | 数据库连接密码 |

## Hibernate jars



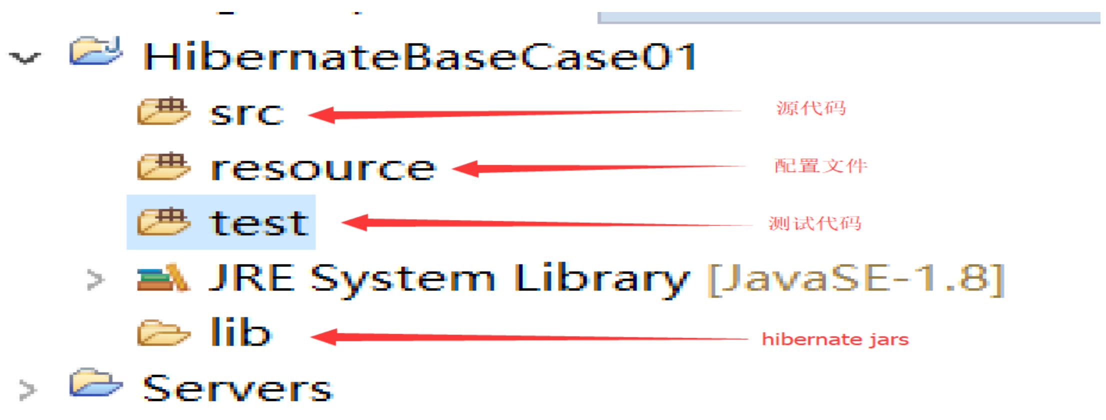
hibernate-release-4.3.11.Final > hibernate-release-4.3.11.Final > lib > required

| 名称 | 修改日期 | 类型 | 大小 |
|---|---|---|---|
| antlr-2.7.7.jar | 2014/05/01 13:50 | Executable Jar File | 435 KB |
| dom4j-1.6.1.jar | 2014/05/01 13:49 | Executable Jar File | 307 KB |
| hibernate-commons-annotations-4.0... | 2014/07/15 10:31 | Executable Jar File | 74 KB |
| hibernate-core-4.3.11.Final.jar | 2015/08/05 20:54 | Executable Jar File | 5,160 KB |
| hibernate-jpa-2.1-api-1.0.0.Final.jar | 2014/05/01 13:50 | Executable Jar File | 111 KB |
| jandex-1.1.0.Final.jar | 2014/05/01 13:50 | Executable Jar File | 75 KB |
| javassist-3.18.1-GA.jar | 2014/05/01 13:49 | Executable Jar File | 698 KB |
| jboss-logging-3.1.3.GA.jar | 2014/05/01 13:50 | Executable Jar File | 56 KB |
| jboss-logging-annotations-1.2.0.Beta... | 2014/05/01 13:50 | Executable Jar File | 12 KB |
| jboss-transaction-api_1.2_spec-1.0.0.... | 2014/05/01 13:50 | Executable Jar File | 28 KB |

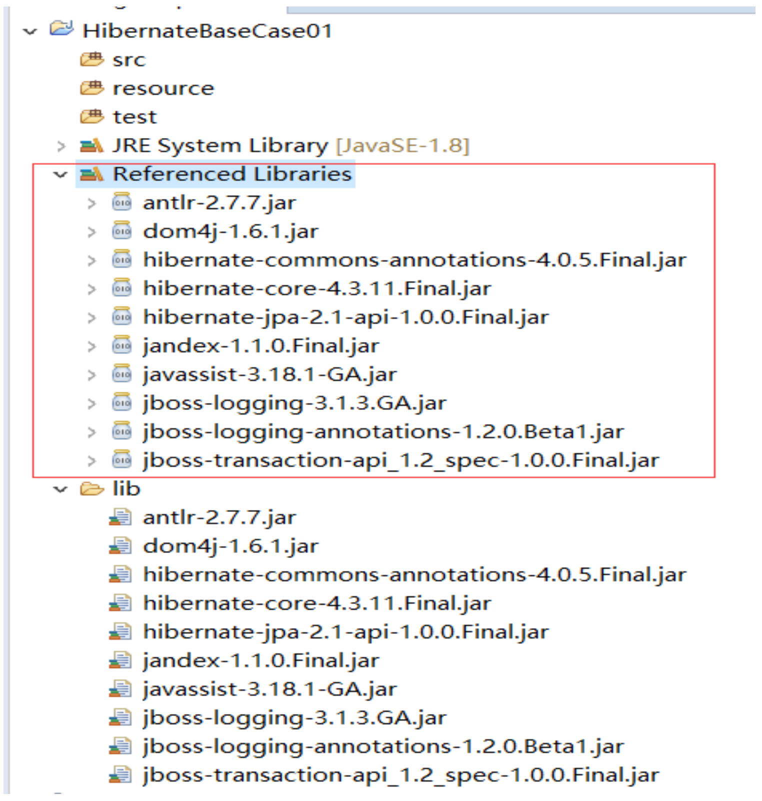
必选jar

## 搭建 Hibernate 实现 DDL

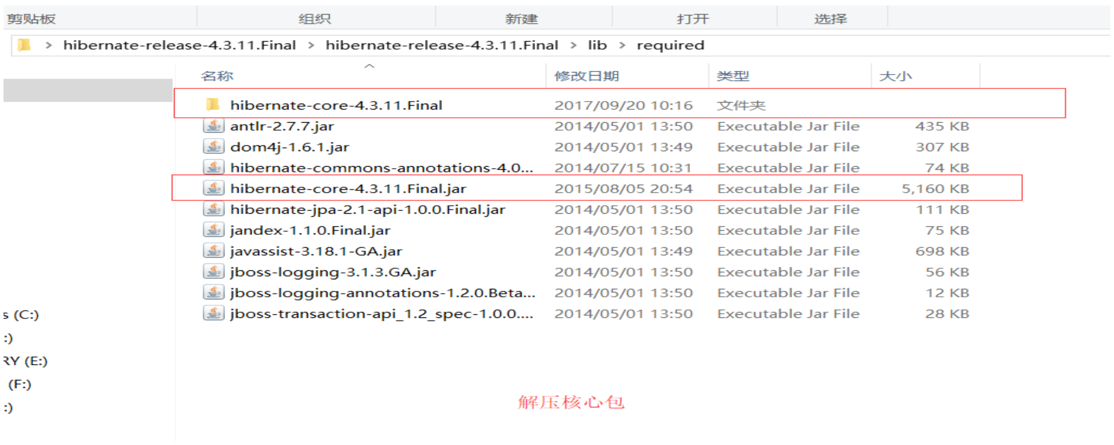
### 项目骨架


```
HibernateBaseCase01
    src
    resource
    test
  > JRE System Library [JavaSE-1.8]
    lib
> Servers
```

### 导入 jars


```
HibernateBaseCase01
    src
    resource
    test
  > JRE System Library [JavaSE-1.8]
  Referenced Libraries
    > antlr-2.7.7.jar
    > dom4j-1.6.1.jar
    > hibernate-commons-annotations-4.0.5.Final.jar
    > hibernate-core-4.3.11.Final.jar
    > hibernate-jpa-2.1-api-1.0.0.Final.jar
    > jandex-1.1.0.Final.jar
    > javassist-3.18.1-GA.jar
    > jboss-logging-3.1.3.GA.jar
    > jboss-logging-annotations-1.2.0.Beta1.jar
    > jboss-transaction-api_1.2_spec-1.0.0.Final.jar
  lib
      antlr-2.7.7.jar
      dom4j-1.6.1.jar
      hibernate-commons-annotations-4.0.5.Final.jar
      hibernate-core-4.3.11.Final.jar
      hibernate-jpa-2.1-api-1.0.0.Final.jar
      jandex-1.1.0.Final.jar
      javassist-3.18.1-GA.jar
      jboss-logging-3.1.3.GA.jar
      jboss-logging-annotations-1.2.0.Beta1.jar
      jboss-transaction-api_1.2_spec-1.0.0.Final.jar
```

## 解压 xxx-core

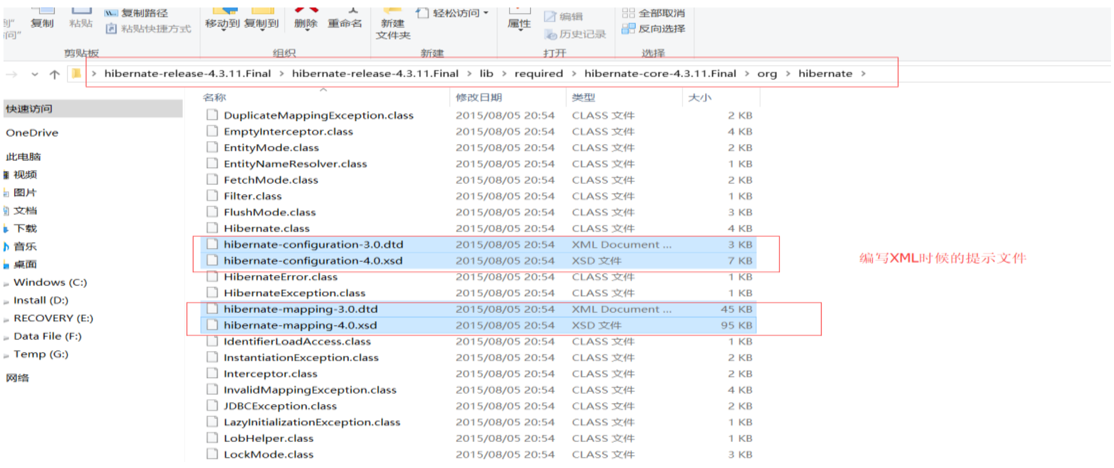


hibernate-release-4.3.11.Final > hibernate-release-4.3.11.Final > lib > required

| 名称 | 修改日期 | 类型 | 大小 |
|---|---|---|---|
| hibernate-core-4.3.11.Final | 2017/09/20 10:16 | 文件夹 | |
| antlr-2.7.7.jar | 2014/05/01 13:50 | Executable Jar File | 435 KB |
| dom4j-1.6.1.jar | 2014/05/01 13:49 | Executable Jar File | 307 KB |
| hibernate-commons-annotations-4.0... | 2014/07/15 10:31 | Executable Jar File | 74 KB |
| hibernate-core-4.3.11.Final.jar | 2015/08/05 20:54 | Executable Jar File | 5,160 KB |
| hibernate-jpa-2.1-api-1.0.0.Final.jar | 2014/05/01 13:50 | Executable Jar File | 111 KB |
| jandex-1.1.0.Final.jar | 2014/05/01 13:50 | Executable Jar File | 75 KB |
| javassist-3.18.1-GA.jar | 2014/05/01 13:49 | Executable Jar File | 698 KB |
| jboss-logging-3.1.3.GA.jar | 2014/05/01 13:50 | Executable Jar File | 56 KB |
| jboss-logging-annotations-1.2.0.Beta... | 2014/05/01 13:50 | Executable Jar File | 12 KB |
| jboss-transaction-api_1.2_spec-1.0.0.... | 2014/05/01 13:50 | Executable Jar File | 28 KB |

解压核心包

## 找到 DTD 作用提供 XML 编写时候的提示



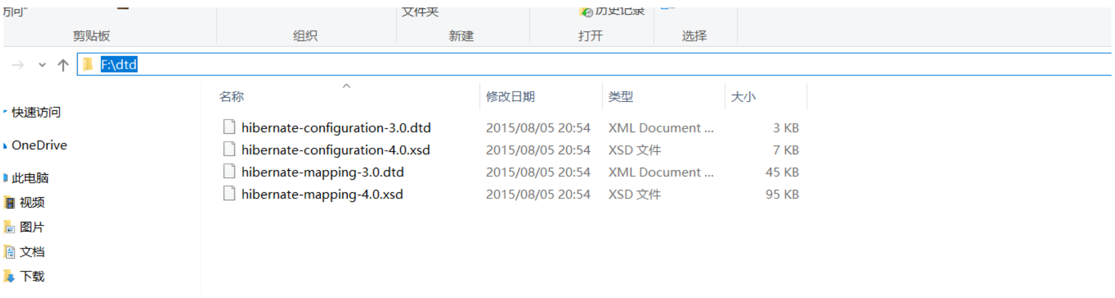
hibernate-release-4.3.11.Final > hibernate-release-4.3.11.Final > lib > required > hibernate-core-4.3.11.Final > org > hibernate >

| 名称 | 修改日期 | 类型 | 大小 |
|---|---|---|---|
| DuplicateMappingException.class | 2015/08/05 20:54 | CLASS 文件 | 2 KB |
| EmptyInterceptor.class | 2015/08/05 20:54 | CLASS 文件 | 4 KB |
| EntityMode.class | 2015/08/05 20:54 | CLASS 文件 | 2 KB |
| EntityNameResolver.class | 2015/08/05 20:54 | CLASS 文件 | 1 KB |
| FetchMode.class | 2015/08/05 20:54 | CLASS 文件 | 2 KB |
| Filter.class | 2015/08/05 20:54 | CLASS 文件 | 1 KB |
| FlushMode.class | 2015/08/05 20:54 | CLASS 文件 | 3 KB |
| Hibernate.class | 2015/08/05 20:54 | CLASS 文件 | 4 KB |
| hibernate-configuration-3.0.dtd | 2015/08/05 20:54 | XML Document ... | 3 KB |
| hibernate-configuration-4.0.xsd | 2015/08/05 20:54 | XSD 文件 | 7 KB |
| HibernateError.class | 2015/08/05 20:54 | CLASS 文件 | 1 KB |
| HibernateException.class | 2015/08/05 20:54 | CLASS 文件 | 1 KB |
| hibernate-mapping-3.0.dtd | 2015/08/05 20:54 | XML Document ... | 45 KB |
| hibernate-mapping-4.0.xsd | 2015/08/05 20:54 | XSD 文件 | 95 KB |
| IdentifierLoadAccess.class | 2015/08/05 20:54 | CLASS 文件 | 1 KB |
| InstantiationException.class | 2015/08/05 20:54 | CLASS 文件 | 2 KB |
| Interceptor.class | 2015/08/05 20:54 | CLASS 文件 | 2 KB |
| InvalidMappingException.class | 2015/08/05 20:54 | CLASS 文件 | 4 KB |
| JDBCException.class | 2015/08/05 20:54 | CLASS 文件 | 2 KB |
| LazyInitializationException.class | 2015/08/05 20:54 | CLASS 文件 | 1 KB |
| LobHelper.class | 2015/08/05 20:54 | CLASS 文件 | 1 KB |
| LockMode.class | 2015/08/05 20:54 | CLASS 文件 | 3 KB |

编写XML时候的提示文件

## IED 配置 DTD

### 第一步:自定目录存放 DTD

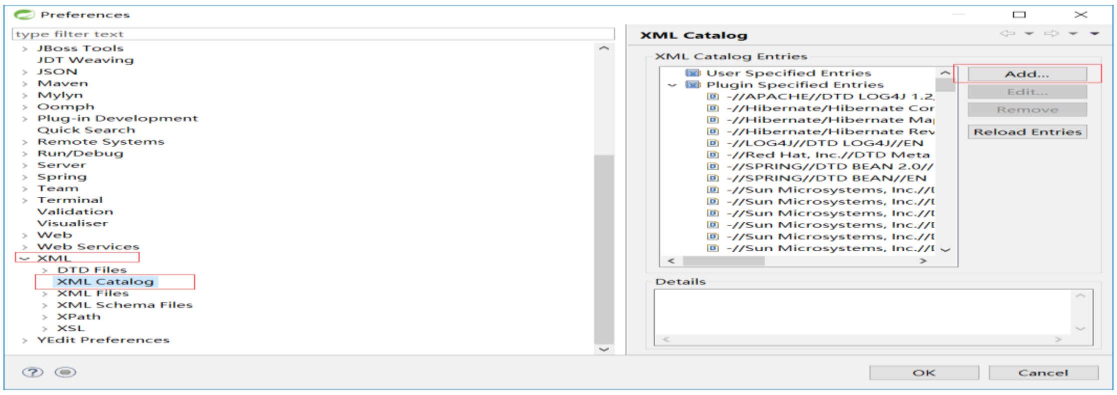


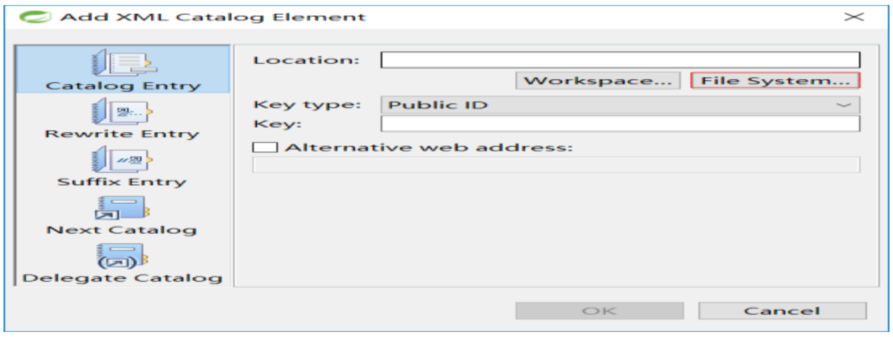
F:\dtd

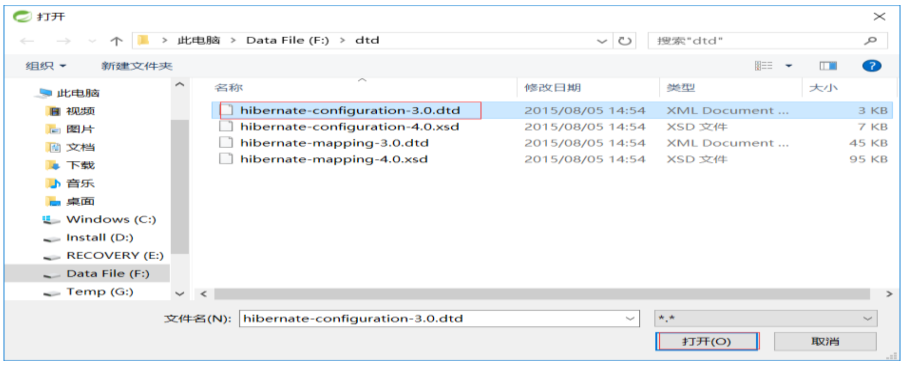
| 名称 | 修改日期 | 类型 | 大小 |
|---|---|---|---|
| hibernate-configuration-3.0.dtd | 2015/08/05 20:54 | XML Document ... | 3 KB |
| hibernate-configuration-4.0.xsd | 2015/08/05 20:54 | XSD 文件 | 7 KB |
| hibernate-mapping-3.0.dtd | 2015/08/05 20:54 | XML Document ... | 45 KB |
| hibernate-mapping-4.0.xsd | 2015/08/05 20:54 | XSD 文件 | 95 KB |

## 第二步:在 IDE 中配置 DTD

Window→preferences→XML→XML Cata Log

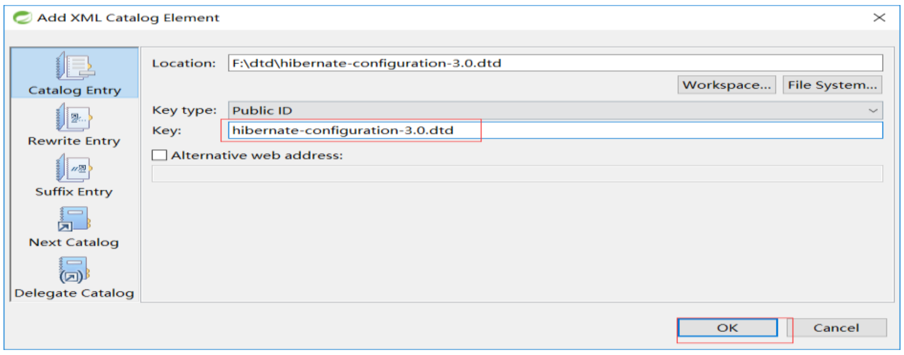






| 名称 | 修改日期 | 类型 | 大小 |
|---|---|---|---|
| hibernate-configuration-3.0.dtd | 2015/08/05 14:54 | XML Document ... | 3 KB |
| hibernate-configuration-4.0.xsd | 2015/08/05 14:54 | XSD 文件 | 7 KB |
| hibernate-mapping-3.0.dtd | 2015/08/05 14:54 | XML Document ... | 45 KB |
| hibernate-mapping-4.0.xsd | 2015/08/05 14:54 | XSD 文件 | 95 KB |

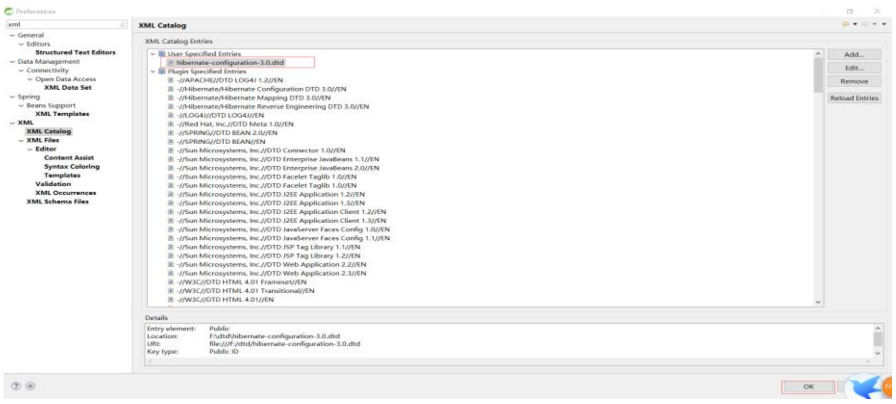
文件名(N): hibernate-configuration-3.0.dtd    *.*



Location: F:\dtd\hibernate-configuration-3.0.dtd

Key type: Public ID

Key: hibernate-configuration-3.0.dtd



User Specified Entries
- hibernate-configuration-3.0.dtd

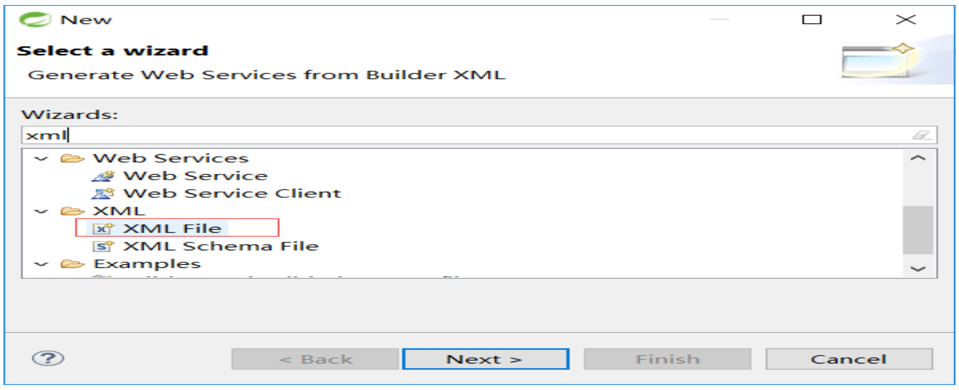
Plugin Specified Entries
- -//APACHE//DTD LOG4J 1.2//EN
- -//Hibernate/Hibernate Configuration DTD 3.0//EN
- -//Hibernate/Hibernate Mapping DTD 3.0//EN
- -//Hibernate/Hibernate Reverse Engineering DTD 3.0//EN
- -//LOG4J//DTD LOG4J//EN
- -//Red Hat, Inc.//DTD Meta 1.0//EN
- -//SPRING//DTD BEAN 2.0//EN
- -//SPRING//DTD BEAN//EN
- -//Sun Microsystems, Inc.//DTD Connector 1.0//EN
- -//Sun Microsystems, Inc.//DTD Enterprise JavaBeans 1.1//EN
- -//Sun Microsystems, Inc.//DTD Enterprise JavaBeans 2.0//EN
- -//Sun Microsystems, Inc.//DTD Facelet Taglib 1.0//EN
- -//Sun Microsystems, Inc.//DTD Facelet Taglib 1.0//EN
- -//Sun Microsystems, Inc.//DTD J2EE Application 1.2//EN
- -//Sun Microsystems, Inc.//DTD J2EE Application 1.3//EN
- -//Sun Microsystems, Inc.//DTD J2EE Application Client 1.2//EN
- -//Sun Microsystems, Inc.//DTD J2EE Application Client 1.3//EN
- -//Sun Microsystems, Inc.//DTD JavaServer Faces Config 1.0//EN
- -//Sun Microsystems, Inc.//DTD JavaServer Faces Config 1.1//EN
- -//Sun Microsystems, Inc.//DTD JSP Tag Library 1.1//EN
- -//Sun Microsystems, Inc.//DTD JSP Tag Library 1.2//EN
- -//Sun Microsystems, Inc.//DTD Web Application 2.2//EN
- -//Sun Microsystems, Inc.//DTD Web Application 2.3//EN
- -//W3C//DTD HTML 4.01 Frameset//EN
- -//W3C//DTD HTML 4.01 Transitional//EN
- -//W3C//DTD HTML 4.01//EN

Details

| | |
|---|---|
| Entry element: | Public |
| Location: | F:\dtd\hibernate-configuration-3.0.dtd |
| URI: | file:///F:/dtd/hibernate-configuration-3.0.dtd |
| Key type: | Public ID |

## 配置 hibernate.cfg.xml

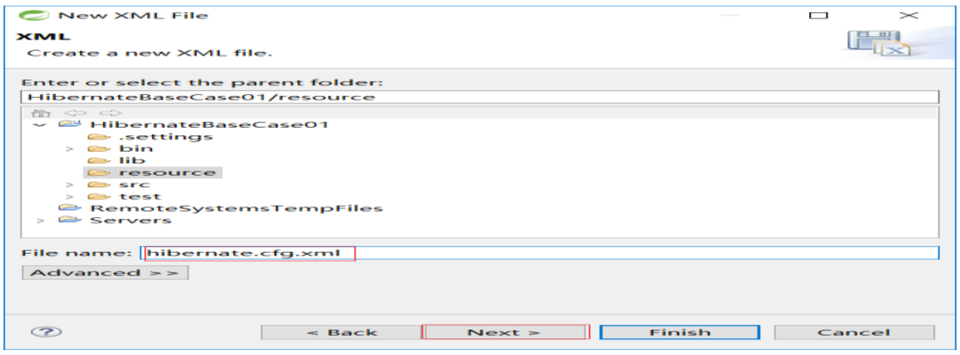
### 第一步构建 hibernate.cfg.xml



**Select a wizard**

Generate Web Services from Builder XML

Wizards: xml

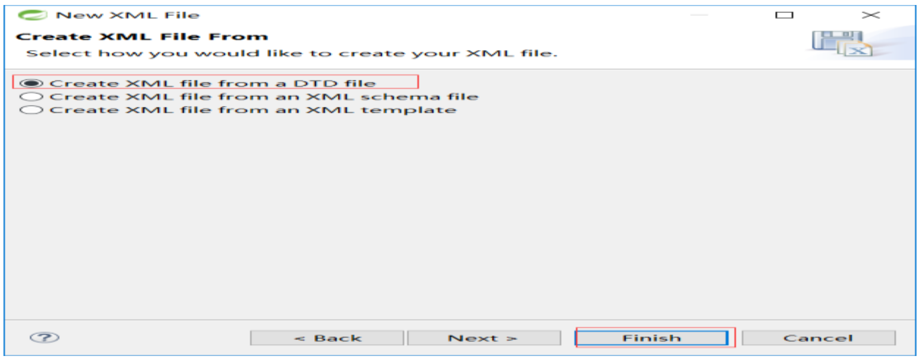


**XML**

Create a new XML file.

Enter or select the parent folder: HibernateBaseCase01/resource

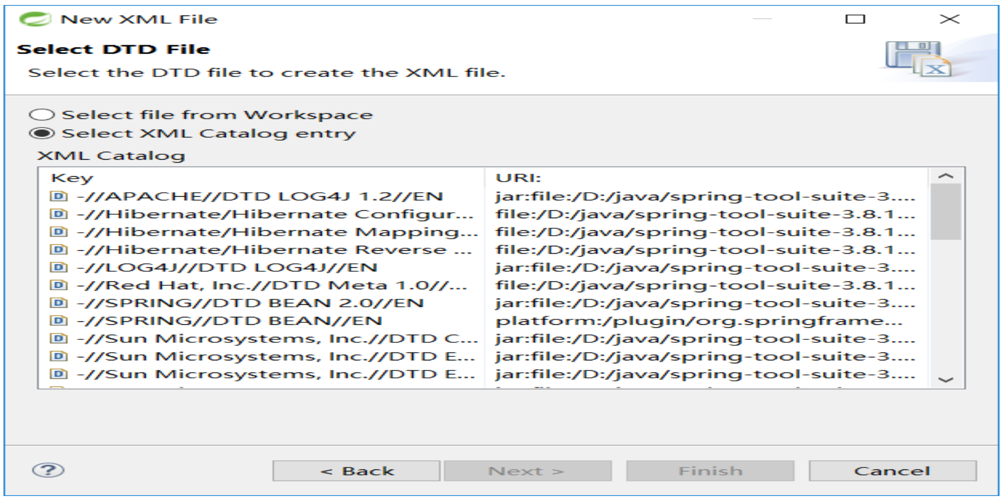
File name: hibernate.cfg.xml



**Create XML File From**

Select how you would like to create your XML file.

[✓ Create XML file from a DTD file]
Create XML file from an XML schema file
Create XML file from an XML template


New XML File

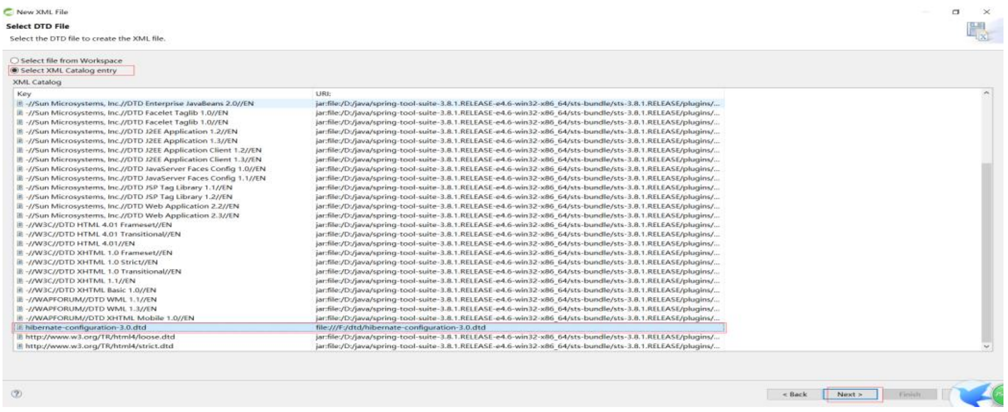
**Select DTD File**

Select the DTD file to create the XML file.

( ) Select file from Workspace
(●) Select XML Catalog entry

XML Catalog

| Key | URI: |
|---|---|
| -//APACHE//DTD LOG4J 1.2//EN | jar:file:/D:/java/spring-tool-suite-3.... |
| -//Hibernate/Hibernate Configur... | file:/D:/java/spring-tool-suite-3.8.1... |
| -//Hibernate/Hibernate Mapping... | file:/D:/java/spring-tool-suite-3.8.1... |
| -//Hibernate/Hibernate Reverse ... | file:/D:/java/spring-tool-suite-3.8.1... |
| -//LOG4J//DTD LOG4J//EN | jar:file:/D:/java/spring-tool-suite-3.... |
| -//Red Hat, Inc.//DTD Meta 1.0//... | file:/D:/java/spring-tool-suite-3.8.1... |
| -//SPRING//DTD BEAN 2.0//EN | jar:file:/D:/java/spring-tool-suite-3.... |
| -//SPRING//DTD BEAN//EN | platform:/plugin/org.springframe... |
| -//Sun Microsystems, Inc.//DTD C... | jar:file:/D:/java/spring-tool-suite-3.... |
| -//Sun Microsystems, Inc.//DTD E... | jar:file:/D:/java/spring-tool-suite-3.... |
| -//Sun Microsystems, Inc.//DTD E... | jar:file:/D:/java/spring-tool-suite-3.... |


New XML File

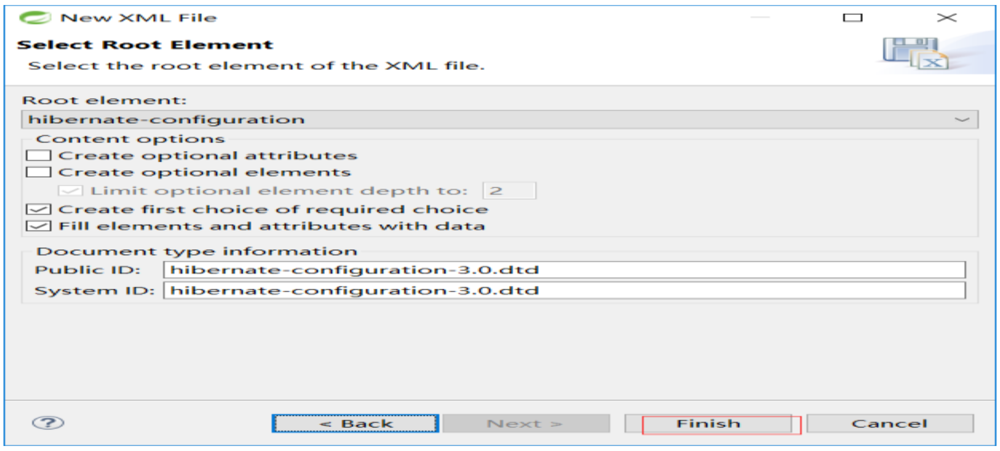
**Select DTD File**

Select the DTD file to create the XML file.

( ) Select file from Workspace
(●) Select XML Catalog entry

XML Catalog

| Key | URI: |
|---|---|
| -//Sun Microsystems, Inc.//DTD Enterprise JavaBeans 2.0//EN | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| -//Sun Microsystems, Inc.//DTD Facelet Taglib 1.0//EN | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| -//Sun Microsystems, Inc.//DTD Facelet Taglib 1.0//EN | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| -//Sun Microsystems, Inc.//DTD J2EE Application 1.2//EN | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| -//Sun Microsystems, Inc.//DTD J2EE Application 1.3//EN | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| -//Sun Microsystems, Inc.//DTD J2EE Application Client 1.2//EN | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| -//Sun Microsystems, Inc.//DTD J2EE Application Client 1.3//EN | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| -//Sun Microsystems, Inc.//DTD JavaServer Faces Config 1.0//EN | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| -//Sun Microsystems, Inc.//DTD JavaServer Faces Config 1.1//EN | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| -//Sun Microsystems, Inc.//DTD JSP Tag Library 1.1//EN | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| -//Sun Microsystems, Inc.//DTD JSP Tag Library 1.2//EN | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| -//Sun Microsystems, Inc.//DTD Web Application 2.2//EN | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| -//Sun Microsystems, Inc.//DTD Web Application 2.3//EN | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| -//W3C//DTD HTML 4.01 Frameset//EN | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| -//W3C//DTD HTML 4.01 Transitional//EN | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| -//W3C//DTD HTML 4.01//EN | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| -//W3C//DTD XHTML 1.0 Frameset//EN | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| -//W3C//DTD XHTML 1.0 Strict//EN | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| -//W3C//DTD XHTML 1.0 Transitional//EN | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| -//W3C//DTD XHTML 1.1//EN | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| -//W3C//DTD XHTML Basic 1.0//EN | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| -//WAPFORUM//DTD WML 1.1//EN | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| -//WAPFORUM//DTD WML 1.3//EN | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| -//WAPFORUM//DTD XHTML Mobile 1.0//EN | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| hibernate-configuration-3.0.dtd | file:///F:/dtd/hibernate-configuration-3.0.dtd |
| http://www.w3.org/TR/html4/loose.dtd | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |
| http://www.w3.org/TR/html4/strict.dtd | jar:file:/D:/java/spring-tool-suite-3.8.1.RELEASE-e4.6-win32-x86_64/sts-bundle/sts-3.8.1.RELEASE/plugins/... |


New XML File

**Select Root Element**

Select the root element of the XML file.

Root element: hibernate-configuration

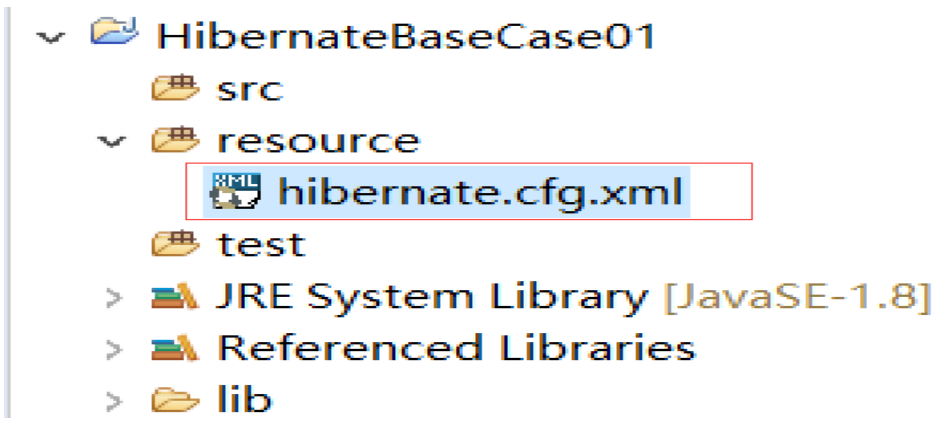
Content options

- [ ] Create optional attributes
- [ ] Create optional elements
- [✓] Limit optional element depth to: 2
- [✓] Create first choice of required choice
- [✓] Fill elements and attributes with data

Document type information

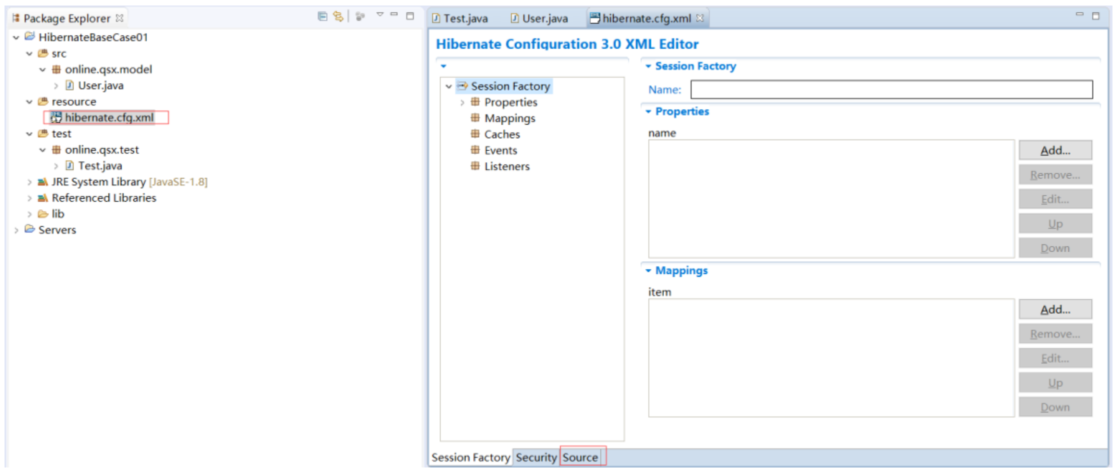
Public ID: hibernate-configuration-3.0.dtd

System ID: hibernate-configuration-3.0.dtd



第二步编辑 **hibernate.cfg.xml[**数据库连接信息**]**

进入编辑页面



Hibernate.cfg.xml

```
<?xml version='1.0' encoding='utf-8'?>
<!DOCTYPE hibernate-configuration PUBLIC
        "-//Hibernate/Hibernate Configuration DTD 3.0//EN"
      "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">
<hibernate-configuration>
  <session-factory/>
</hibernate-configuration>
```

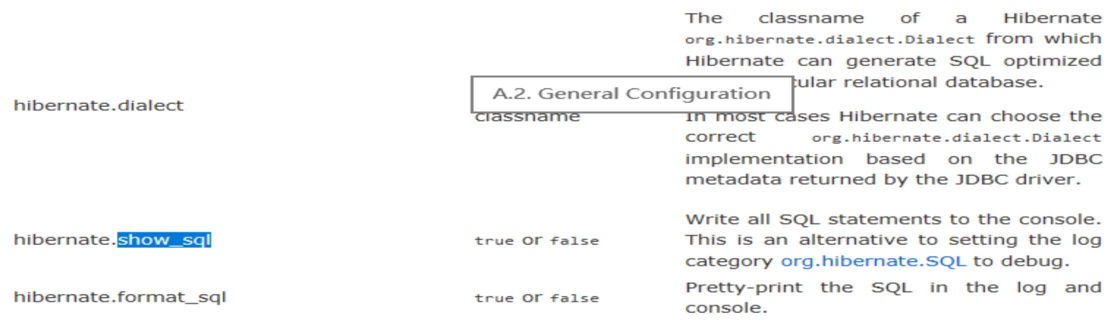
**配置 hibernate.cfg.xml 数据库连接信息**

```
<?xml version='1.0' encoding='utf-8'?>
<!DOCTYPE hibernate-configuration PUBLIC
        "-//Hibernate/Hibernate Configuration DTD 3.0//EN"
      "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">
    <session-factory>
```

```
        <!-- hibernate 第一部分[数据库连接信息]-->
        <property
name="connection.url">jdbc:mysql://localhost:3306/myschool</property
>
        <property
name="connection.driver_class">com.mysql.jdbc.Driver</property>
        <property name="connection.username">root</property>
        <property name="connection.password">root</property>

    </session-factory>
</hibernate-configuration>
```

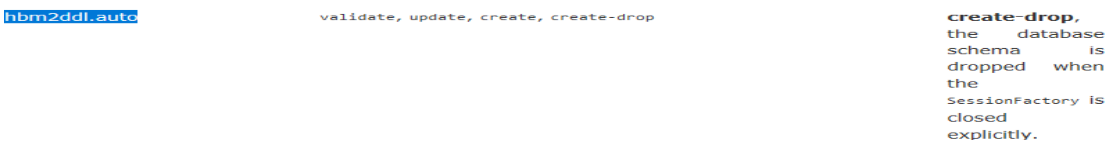
**第三步编辑 hibernate.cfg.xml[hibernate 参数控制]**

**hibernate 参数官网描述截图**



A.2. General Configuration

| | | |
|---|---|---|
| hibernate.dialect | classname | The classname of a Hibernate org.hibernate.dialect.Dialect from which Hibernate can generate SQL optimized ular relational database. In most cases Hibernate can choose the correct org.hibernate.dialect.Dialect implementation based on the JDBC metadata returned by the JDBC driver. |
| hibernate.show_sql | true or false | Write all SQL statements to the console. This is an alternative to setting the log category org.hibernate.SQL to debug. |
| hibernate.format_sql | true or false | Pretty-print the SQL in the log and console. |



| | | |
|---|---|---|
| hbm2ddl.auto | validate, update, create, create-drop | create-drop, the database schema is dropped when the SessionFactory is closed explicitly. |

**hibernate.cfg.xml 参数配置**

```
<?xml version='1.0' encoding='utf-8'?>
<!DOCTYPE hibernate-configuration PUBLIC
        "-//Hibernate/Hibernate Configuration DTD 3.0//EN"
      "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">
<hibernate-configuration>
    <session-factory>
        <!-- hibernate 第一部分[数据库连接信息]-->
        <property
name="connection.url">jdbc:mysql://localhost:3306/myschool</property>
        <property
name="connection.driver_class">com.mysql.jdbc.Driver</property>
        <property name="connection.username">root</property>
        <property name="connection.password">root</property>
        <!-- hibernate 第二部分[hibernate 参数控制]-->
        <property
name="hibernate.dialect">org.hibernate.dialect.MySQL5Dialect</property>
<!-- sql正对的是mysql数据库 -->
        <property name="hibernate.show_sql">true</property><!-- 显示sql
-->
        <property name="hibernate.format_sql">true</property><!-- sql格式
化 -->
        <property name="hbm2ddl.auto">create</property><!-- ddl控制 -->

    </session-factory>
</hibernate-configuration>
```

**第四步编辑 hibernate.cfg.xml[hibernate 表的映射信息]**

**Hibernate.cfg.xml 配置**

```
<?xml version='1.0' encoding='utf-8'?>
<!DOCTYPE hibernate-configuration PUBLIC
        "-//Hibernate/Hibernate Configuration DTD 3.0//EN"
      "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">
<hibernate-configuration>
    <session-factory>
        <!-- hibernate 第一部分[数据库连接信息]-->
        <property
name="connection.url">jdbc:mysql://localhost:3306/myschool</property
>
        <property
name="connection.driver_class">com.mysql.jdbc.Driver</property>
        <property name="connection.username">root</property>
        <property name="connection.password">root</property>

        <!-- hibernate 第二部分[hibernate 参数控制]-->
        <property
name="hibernate.dialect">org.hibernate.dialect.MySQL5Dialect</proper
ty><!-- sql正对的是mysql数据库 -->
        <property name="hibernate.show_sql">true</property><!-- 显示
sql -->
        <property name="hibernate.format_sql">true</property><!-- sql
格式化 -->
        <property name="hbm2ddl.auto">create</property><!-- ddl控制 -->

        <!-- hibernate 第三部分[表的映射信息][注解]-->
        <mapping class="online.qsx.model.User"/>

    </session-factory>
</hibernate-configuration>
```

## 注解实习实体映射配置

```
package online.qsx.model;

import java.util.Date;

import javax.persistence.Column;
import javax.persistence.Entity;
import javax.persistence.GeneratedValue;
import javax.persistence.GenerationType;
import javax.persistence.Id;
import javax.persistence.Table;
import javax.persistence.Temporal;
import javax.persistence.TemporalType;

@Entity
@Table(name = "tb_user")
public class User {
    @Id // 主键
    @GeneratedValue(strategy = GenerationType.IDENTITY) // 自增
    @Column(name = "user_id")
    private Long id;

    @Column(name = "user_name", unique = true)
    private String name;

    @Column(name = "user_sex")
    private Short sex;

    @Column(name = "user_age")
    private Short age;

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

    // TemporalType.DATE yyyy-MM-dd
    // TemporalType.TIME yyyy-MM-dd hh:mm:ss
    @Temporal(TemporalType.DATE)
    @Column(name = "user_birthday")
    private Date birthdayDate;

    public Long getId() {
        return id;
    }

    public void setId(Long id) {
        this.id = id;
    }

    public String getName() {
        return name;
    }

    public void setName(String name) {
        this.name = name;
    }

    public Short getSex() {
        return sex;
    }

    public void setSex(Short sex) {
        this.sex = sex;
    }

    public Short getAge() {
        return age;
    }

    public void setAge(Short age) {
        this.age = age;
    }

    public String getPhone() {
        return phone;
    }

    public void setPhone(String phone) {
        this.phone = phone;
    }

    public Date getBirthdayDate() {
        return birthdayDate;
```

```
	}

	public void setBirthdayDate(Date birthdayDate) {
		this.birthdayDate = birthdayDate;
	}
}
```

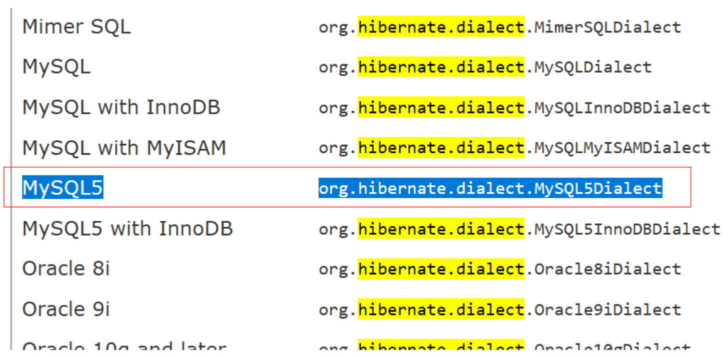
**第五步测试**

```
package online.qsx.test;

import org.hibernate.Session;
import org.hibernate.SessionFactory;
import org.hibernate.boot.registry.StandardServiceRegistry;
import org.hibernate.boot.registry.StandardServiceRegistryBuilder;
import org.hibernate.cfg.Configuration;

public class Test {
	public static void main(String[] args) {
		//加载配置文件
		Configuration configuration=new Configuration();
		configuration.configure("hibernate.cfg.xml");

		//注册标准服务
		StandardServiceRegistryBuilder ssrb=new StandardServiceRegistryBuilder();
		StandardServiceRegistry ssr=ssrb.applySettings(configuration.getProperties()).build();

		//通过标准服务加载配置文件后获得会话工厂
		SessionFactory sf=configuration.buildSessionFactory(ssr);//二级缓存

		//开启一个会话
		Session session=sf.openSession();//一级缓存

		//操作
		System.out.println("连接开启成功");

		//关闭
		session.close();
		sf.close();

		System.out.println("连接关闭成功");

	}
}
```

## 搭建 Hibernate 实现 DDL 扩展

## MySQL 表类型/解决 MySQL 表字符集的问题

### 扩展 hibernate API



| | |
|---|---|
| Mimer SQL | org.hibernate.dialect.MimerSQLDialect |
| MySQL | org.hibernate.dialect.MySQLDialect |
| MySQL with InnoDB | org.hibernate.dialect.MySQLInnoDBDialect |
| MySQL with MyISAM | org.hibernate.dialect.MySQLMyISAMDialect |
| MySQL5 | org.hibernate.dialect.MySQL5Dialect |
| MySQL5 with InnoDB | org.hibernate.dialect.MySQL5InnoDBDialect |
| Oracle 8i | org.hibernate.dialect.Oracle8iDialect |
| Oracle 9i | org.hibernate.dialect.Oracle9iDialect |
| Oracle 10g and later | org.hibernate.dialect.Oracle10gDialect |

### 实现扩展

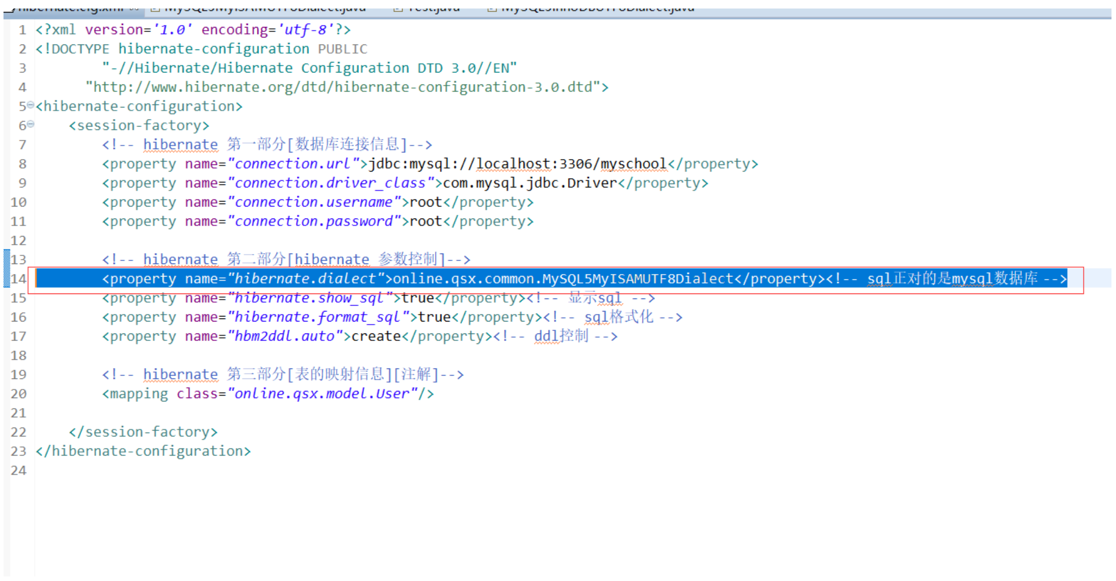
#### InnoDB utf-8

```java
package online.qsx.common;

import org.hibernate.dialect.MySQL5Dialect;

public class MySQL5InnoDBUTF8Dialect extends MySQL5Dialect {

    @Override
    public String getTableTypeString() {
        return "ENGINE=InnoDB CHARSET=utf8";
    }

}
```

#### MyISAM utf-8

```java
package online.qsx.common;

import org.hibernate.dialect.MySQL5Dialect;

public class MySQL5MyISAMUTF8Dialect extends MySQL5Dialect {
    @Override
    public String getTableTypeString() {
        return "ENGINE=MyISAM CHARSET=utf8";
    }

}
```

## hibernate.cfg.xml



```
<?xml version='1.0' encoding='utf-8'?>
<!DOCTYPE hibernate-configuration PUBLIC
        "-//Hibernate/Hibernate Configuration DTD 3.0//EN"
      "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">
<hibernate-configuration>
    <session-factory>
        <!-- hibernate 第一部分[数据库连接信息]-->
        <property name="connection.url">jdbc:mysql://localhost:3306/myschool</property>
        <property name="connection.driver_class">com.mysql.jdbc.Driver</property>
        <property name="connection.username">root</property>
        <property name="connection.password">root</property>

        <!-- hibernate 第二部分[hibernate 参数控制]-->
        <property name="hibernate.dialect">online.qsx.common.MySQL5MyISAMUTF8Dialect</property><!-- sql正对的是mysql数据库 -->
        <property name="hibernate.show_sql">true</property><!-- 显示sql -->
        <property name="hibernate.format_sql">true</property><!-- sql格式化 -->
        <property name="hbm2ddl.auto">create</property><!-- ddl控制 -->

        <!-- hibernate 第三部分[表的映射信息][注解]-->
        <mapping class="online.qsx.model.User"/>

    </session-factory>
</hibernate-configuration>
```

```
<?xml version='1.0' encoding='utf-8'?>
<!DOCTYPE hibernate-configuration PUBLIC
        "-//Hibernate/Hibernate Configuration DTD 3.0//EN"
      "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">
<hibernate-configuration>
    <session-factory>
        <!-- hibernate 第一部分[数据库连接信息]-->
        <property 
name="connection.url">jdbc:mysql://localhost:3306/myschool</property
>
        <property 
name="connection.driver_class">com.mysql.jdbc.Driver</property>
        <property name="connection.username">root</property>
        <property name="connection.password">root</property>

        <!-- hibernate 第二部分[hibernate 参数控制]-->
        <property 
name="hibernate.dialect">online.qsx.common.MySQL5MyISAMUTF8Dialect</
```

```
property><!-- sql正对的是mysql数据库 -->
        <property name="hibernate.show_sql">true</property><!-- 显示 
sql -->
        <property name="hibernate.format_sql">true</property><!-- sql 
格式化 -->
        <property name="hbm2ddl.auto">create</property><!-- ddl控制 -->

        <!-- hibernate 第三部分[表的映射信息][注解]-->
        <mapping class="online.qsx.model.User"/>

    </session-factory>
</hibernate-configuration>
```

## User.java

```
package online.qsx.model;

import java.util.Date;

import javax.persistence.Column;
import javax.persistence.Entity;
import javax.persistence.GeneratedValue;
import javax.persistence.GenerationType;
import javax.persistence.Id;
import javax.persistence.Table;
import javax.persistence.Temporal;
import javax.persistence.TemporalType;

@Entity
@Table(name = "tb_user")
public class User {
	@Id //  主键
	@GeneratedValue(strategy = GenerationType.IDENTITY) //  自增
	@Column(name = "user_id")
	private Long id;

	@Column(name = "user_name", unique = true)
	private String name;

	@Column(name = "user_sex")
	private Short sex;
```

```
    @Column(name = "user_age")
    private Short age;

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

    // TemporalType.DATE yyyy-MM-dd
    // TemporalType.TIME yyyy-MM-dd hh:mm:ss
    @Temporal(TemporalType.DATE)
    @Column(name = "user_birthday")
    private Date birthdayDate;

    public Long getId() {
        return id;
    }

    public void setId(Long id) {
        this.id = id;
    }

    public String getName() {
        return name;
    }

    public void setName(String name) {
        this.name = name;
    }

    public Short getSex() {
        return sex;
    }

    public void setSex(Short sex) {
        this.sex = sex;
    }

    public Short getAge() {
        return age;
    }

    public void setAge(Short age) {
        this.age = age;
    }
```

```
	public String getPhone() {
		return phone;
	}

	public void setPhone(String phone) {
		this.phone = phone;
	}

	public Date getBirthdayDate() {
		return birthdayDate;
	}

	public void setBirthdayDate(Date birthdayDate) {
		this.birthdayDate = birthdayDate;
	}
}
```

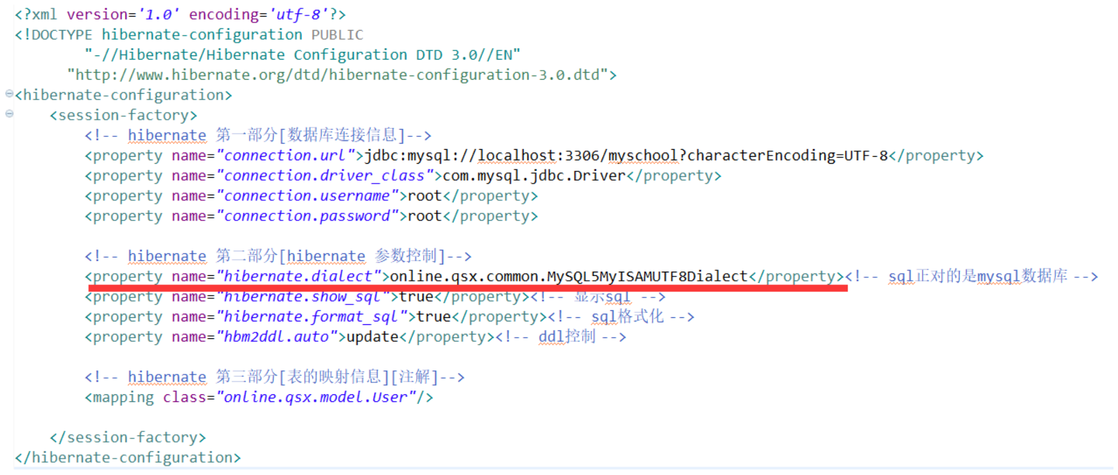
## Test.java

```
package online.qsx.test;

import org.hibernate.Session;
import org.hibernate.SessionFactory;
import org.hibernate.boot.registry.StandardServiceRegistry;
import org.hibernate.boot.registry.StandardServiceRegistryBuilder;
import org.hibernate.cfg.Configuration;

public class Test {
	public static void main(String[] args) {
		//加载配置文件
		Configuration configuration=new Configuration();
		configuration.configure("hibernate.cfg.xml");

		//注册标准服务
		StandardServiceRegistryBuilder ssrb=new StandardServiceRegistryBuilder();
		StandardServiceRegistry ssr=ssrb.applySettings(configuration.getProperties()).build();

		//通过标准服务加载配置文件后获得会话工厂
		SessionFactory sf=configuration.buildSessionFactory(ssr);//二级缓存

		//开启一个会话
		Session session=sf.openSession();//一级缓存
```

```
            //操作
            System.out.println("连接开启成功");

            //关闭
            session.close();
            sf.close();

            System.out.println("连接关闭成功");

      }
}
```

## 使用 Hibernate 完成 CRUD

## Hibernate 添加时中文乱码处理



```xml
<?xml version='1.0' encoding='utf-8'?>
<!DOCTYPE hibernate-configuration PUBLIC
        "-//Hibernate/Hibernate Configuration DTD 3.0//EN"
      "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">
<hibernate-configuration>
    <session-factory>
        <!-- hibernate 第一部分[数据库连接信息]-->
        <property name="connection.url">jdbc:mysql://localhost:3306/myschool?characterEncoding=UTF-8</property>
        <property name="connection.driver_class">com.mysql.jdbc.Driver</property>
        <property name="connection.username">root</property>
        <property name="connection.password">root</property>

        <!-- hibernate 第二部分[hibernate 参数控制]-->
        <property name="hibernate.dialect">online.qsx.common.MySQL5MyISAMUTF8Dialect</property><!-- sql正对的是mysql数据库 -->
        <property name="hibernate.show_sql">true</property><!-- 显示sql -->
        <property name="hibernate.format_sql">true</property><!-- sql格式化 -->
        <property name="hbm2ddl.auto">update</property><!-- ddl控制 -->

        <!-- hibernate 第三部分[表的映射信息][注解]-->
        <mapping class="online.qsx.model.User"/>

    </session-factory>
</hibernate-configuration>
```

## 优化代码抽取方法

```java
package online.qsx.test;

import java.util.Date;

import org.hibernate.Session;
import org.hibernate.SessionFactory;
import org.hibernate.boot.registry.StandardServiceRegistry;
import org.hibernate.boot.registry.StandardServiceRegistryBuilder;
import org.hibernate.cfg.Configuration;
import online.qsx.model.User;

public class Test {
    SessionFactory sf = null;
    Session session = null;
    Transaction transaction = null;

    /**
     * 开启hibernate连接
     */
    public void init() {
        // 加载配置文件
        Configuration configuration = new Configuration();
        configuration.configure("hibernate.cfg.xml");
        // 注册标准服务
        StandardServiceRegistryBuilder ssrb = new
StandardServiceRegistryBuilder();
        StandardServiceRegistry ssr =
ssrb.applySettings(configuration.getProperties()).build();
        // 通过标准服务加载配置文件后获得会话工厂
        sf = configuration.buildSessionFactory(ssr);// 二级缓存
        // 开启一个会话
        session = sf.openSession();// 一级缓存
        //开启事物
        transaction=session.beginTransaction();
        // 操作
        System.out.println("连接开启成功");
    }

    /**
     * 关闭hibernate连接
     */
    public void destroy() {
        //提交事物
        transaction.commit();
        // 关闭
        session.close();
        sf.close();
        System.out.println("连接关闭成功");
    }
}
```

## save

```
    /**
     * 添加 save
     */
    public void save() {
        init();
        User user =new User("1111", Short.valueOf("1"),
Short.valueOf("1"), "111111", new Date());
        session.save(user);
        destroy();
    }
Hibernate:
    insert
    into
        tb_user
        (user_age, user_birthday, user_name, user_phone, user_sex)
    values
        (?, ?, ?, ?, ?)
```

## update

```
    /**
     * 添加 update
     */
    public void update() {
        init();
        User user =new User(3L,"66666", Short.valueOf("1"),
Short.valueOf("1"), "111111", new Date());
        session.update(user);
        destroy();
    }
Hibernate:
    update
        tb_user
    set
        user_age=?,
        user_birthday=?,
        user_name=?,
        user_phone=?,
        user_sex=?
    where
        user_id=?
```

## saveOrUpdate

```
    /**
     * 添加 save
     */
    public void saveOrUpdate_save() {
        init();
        User user =new User("2222", Short.valueOf("1"),
Short.valueOf("1"), "111111", new Date());
        session.saveOrUpdate(user);
        destroy();
    }
Hibernate:
    insert
    into
        tb_user
        (user_age, user_birthday, user_name, user_phone, user_sex)
    values
        (?, ?, ?, ?, ?)
    /**
     * 添加 update
     */
    public void saveOrUpdate_update() {
        init();
        User user =new User(3L,"444", Short.valueOf("1"),
Short.valueOf("1"), "111111", new Date());
        session.saveOrUpdate(user);
        destroy();
    }
Hibernate:
    update
        tb_user
    set
        user_age=?,
        user_birthday=?,
        user_name=?,
        user_phone=?,
        user_sex=?
    where
```

```
        user_id=?
```

## merge

```
    /**
     * 合并
     * save---->insert
     */
    public void merge_save(){
        init();
        User user =new User("123123", Short.valueOf("1"),
Short.valueOf("1"), "111111", new Date());
        session.merge(user);
        destroy();
    }
Hibernate:
    insert
    into
        tb_user
        (user_age, user_birthday, user_name, user_phone, user_sex)
    values
        (?, ?, ?, ?, ?)
    /**
     * 合并
     * update--->select update
     */
    public void merge_update(){
        init();
        User user =new User(1L,"123123", Short.valueOf("1"),
Short.valueOf("1"), "111111", new Date());
        session.merge(user);
        destroy();
    }
Hibernate:
    select
        user0_.user_id as user_id1_0_0_,
        user0_.user_age as user_age2_0_0_,
        user0_.user_birthday as user_bir3_0_0_,
        user0_.user_name as user_nam4_0_0_,
        user0_.user_phone as user_pho5_0_0_,
        user0_.user_sex as user_sex6_0_0_
    from
```

```
        tb_user user0_
    where
        user0_.user_id=?
Hibernate: 
    insert 
    into
        tb_user
        (user_age, user_birthday, user_name, user_phone, user_sex) 
    values
        (?, ?, ?, ?, ?)
```

## delete

```
    /**
     * 删除
     */
    public void delete(){
        init();
        session.delete(new User(1L));
        destroy();
    }
Hibernate: 
    delete 
    from
        tb_user 
    where
        user_id=?
```

## get

```
    /**
     * 查询 get 立即加载  查询的时候立刻加载数据
     */
    public void get(){
        init();
        User user=(User) session.get(User.class, 1L);
        System.out.println(user.toString());
        destroy();
    }
Hibernate: 
    select
        user0_.user_id as user_id1_0_0_,
        user0_.user_age as user_age2_0_0_,
        user0_.user_birthday as user_bir3_0_0_,
        user0_.user_name as user_nam4_0_0_,
        user0_.user_phone as user_pho5_0_0_,
        user0_.user_sex as user_sex6_0_0_
    from
        tb_user user0_
    where
        user0_.user_id=?
User [id=1, name=张三, sex=1, age=12, phone=15384562145, birthdayDate=2017-09-20]
```

## load

```
    /**
     * 查询 load 懒加载  使用数据的时候才去加载数据
     */
    public void load(){
        init();
        User user=(User) session.load(User.class, 1L);
        System.out.println(user.toString());
        destroy();
    }
Hibernate:
    select
        user0_.user_id as user_id1_0_0_,
        user0_.user_age as user_age2_0_0_,
        user0_.user_birthday as user_bir3_0_0_,
        user0_.user_name as user_nam4_0_0_,
        user0_.user_phone as user_pho5_0_0_,
        user0_.user_sex as user_sex6_0_0_
    from
        tb_user user0_
    where
        user0_.user_id=?
User [id=1, name=张三, sex=1, age=12, phone=15384562145, birthdayDate=2017-09-20]
```

## 课程作业:

平台推送

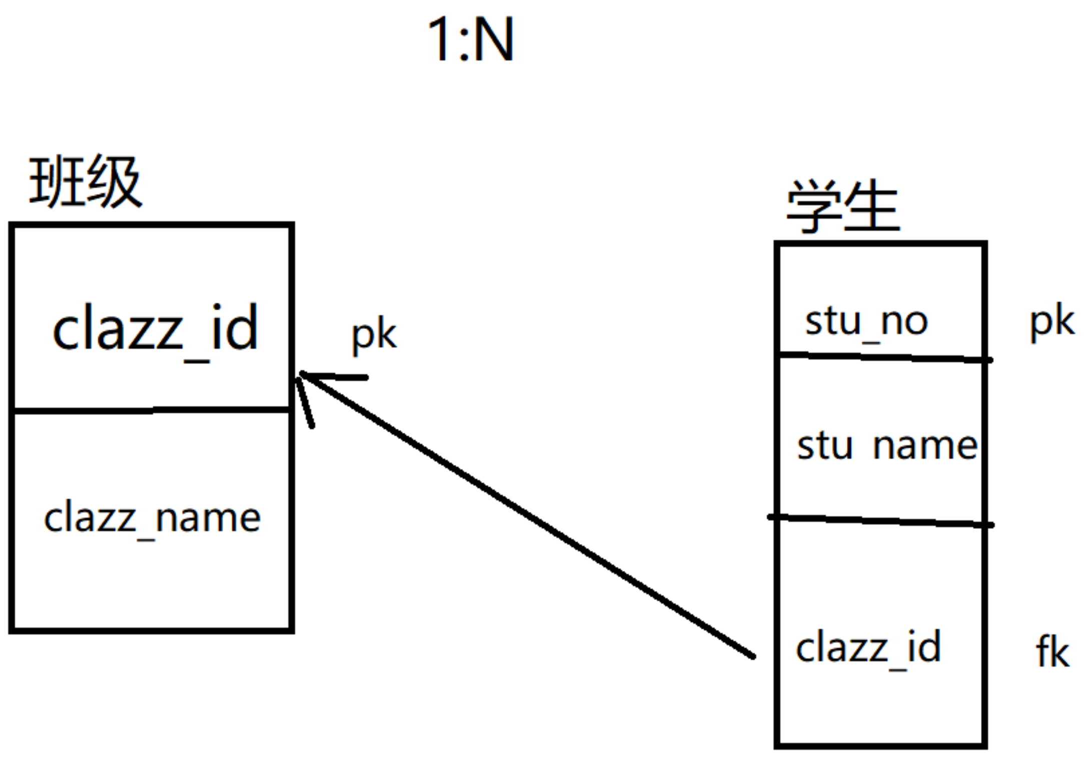
利用 **Hibernate** 实现商品数据的增删改查

## 初始 Hibernate 关系映射

## 课程目标

单项一对多关系映射

图解



## 代码演示

### Student.java

```java
package online.qsx.model;

import javax.persistence.Column;
import javax.persistence.Entity;
import javax.persistence.GeneratedValue;
import javax.persistence.GenerationType;
import javax.persistence.Id;
import javax.persistence.Table;

@Entity
@Table(name = "tb_student")
public class Student {

	@Id
	@GeneratedValue(strategy = GenerationType.IDENTITY)
	@Column(name = "stu_no")
	private Long id;

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

	public Long getId() {
		return id;
	}

	public void setId(Long id) {
		this.id = id;
	}

	public String getName() {
		return name;
	}

	public void setName(String name) {
		this.name = name;
	}

	public Student(Long id, String name) {
		super();
		this.id = id;
		this.name = name;
	}

	public Student(String name) {
		super();
		this.name = name;
	}

	public Student(Long id) {
		super();
		this.id = id;
	}

	public Student() {
		super();
	}

	@Override
	public String toString() {
		return "Student [id=" + id + ", name=" + name + "]";
	}

}
```

**Clazz.java**

```
package online.qsx.model;

import java.util.HashSet;
import java.util.Set;

import javax.persistence.CascadeType;
import javax.persistence.Column;
import javax.persistence.Entity;
import javax.persistence.FetchType;
import javax.persistence.GeneratedValue;
import javax.persistence.GenerationType;
import javax.persistence.Id;
import javax.persistence.JoinColumn;
import javax.persistence.OneToMany;
import javax.persistence.Table;

@Entity
@Table(name = "tb_clazz")
```

```
public class Clazz {

	@Id
	@GeneratedValue(strategy = GenerationType.IDENTITY)
	@Column(name = "clazz_id")
	private Long id;

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

	// 特殊属性
	// 1 : N
	@OneToMany
	@JoinColumn(name = "clazz_id")
	private Set<Student> students = new HashSet<Student>();

	public Long getId() {
		return id;
	}

	public void setId(Long id) {
		this.id = id;
	}

	public String getName() {
		return name;
	}

	public void setName(String name) {
		this.name = name;
	}

	public Set<Student> getStudents() {
		return students;
	}

	public void setStudents(Set<Student> students) {
		this.students = students;
	}

	public Clazz(Long id, String name) {
		super();
		this.id = id;
		this.name = name;
```

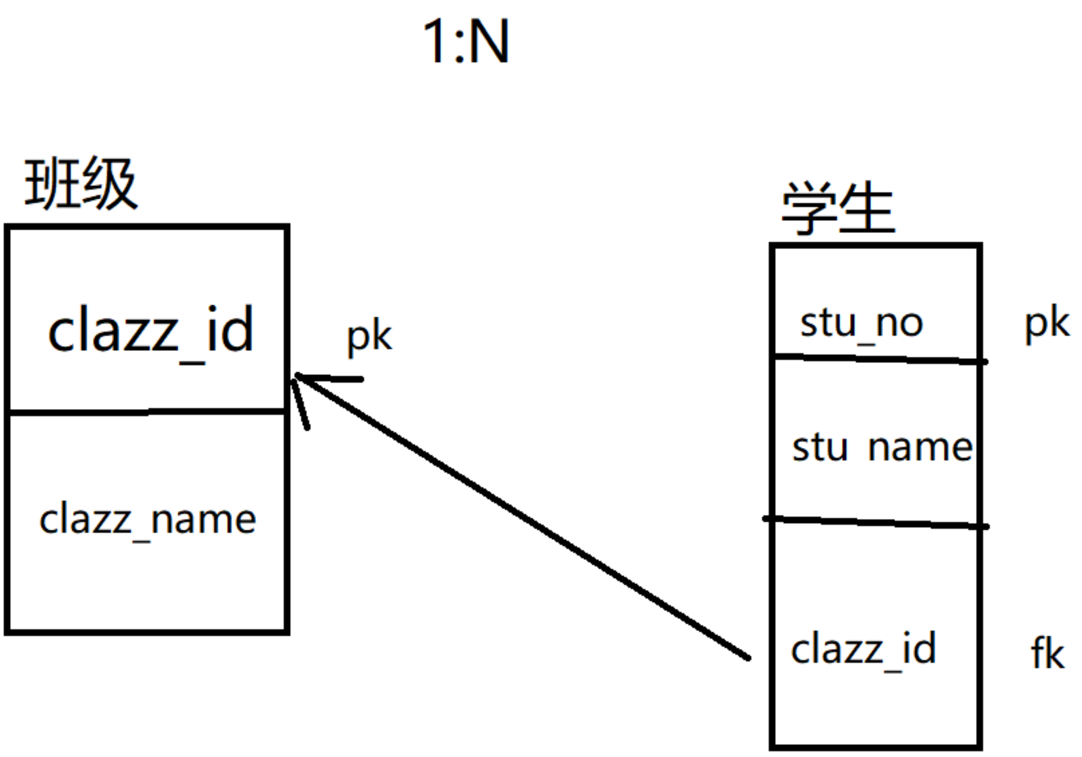
```
    }

    public Clazz(String name) {
        super();
        this.name = name;
    }

    public Clazz(Long id) {
        super();
        this.id = id;
    }

    public Clazz() {
        super();
    }

    @Override
    public String toString() {
        return "Clazz [id=" + id + ", name=" + name + "]";
    }

    public String toStringAndStudents() {
        return "Clazz [id=" + id + ", name=" + name + ",students=" + students + "]";
    }

}
```

**Test.java**

```
package online.qsx.test;

import org.hibernate.Session;
import org.hibernate.SessionFactory;
import org.hibernate.Transaction;
import org.hibernate.boot.registry.StandardServiceRegistry;
import org.hibernate.boot.registry.StandardServiceRegistryBuilder;
import org.hibernate.cfg.Configuration;

import online.qsx.model.Clazz;
import online.qsx.model.Student;

public class Test {
    SessionFactory sf = null;
    Session session = null;
    Transaction transaction = null;

    /**
     * 开启hibernate连接
     */
    public void init() {
        // 加载配置文件
        Configuration configuration = new Configuration();
        configuration.configure("hibernate.cfg.xml");
        // 注册标准服务
        StandardServiceRegistryBuilder ssrb = new
StandardServiceRegistryBuilder();
        StandardServiceRegistry ssr =
ssrb.applySettings(configuration.getProperties()).build();
        // 通过标准服务加载配置文件后获得会话工厂
        sf = configuration.buildSessionFactory(ssr);// 二级缓存
        // 开启一个会话
        session = sf.openSession();// 一级缓存
        // 开启事物
        transaction = session.beginTransaction();
        // 操作
        System.out.println("连接开启成功");
    }

    /**
     * 关闭hibernate连接
     */
    public void destroy() {
        // 提交事物
        transaction.commit();
        // 关闭
        session.close();
        sf.close();
        System.out.println("连接关闭成功");
    }

    /**
     * 级联添加
     */
    public void save(){
        init();
        System.out.println("构建表结构");
        destroy();
    }
    public static void main(String[] args) {
        Test test = new Test();
        test.save();
    }
}
```

单项多对一关系映射

图解



代码演示

**Student.java**

```
package online.qsx.model;

import javax.persistence.CascadeType;
import javax.persistence.Column;
import javax.persistence.Entity;
import javax.persistence.FetchType;
import javax.persistence.GeneratedValue;
import javax.persistence.GenerationType;
import javax.persistence.Id;
import javax.persistence.JoinColumn;
import javax.persistence.ManyToOne;
import javax.persistence.Table;

@Entity
@Table(name = "tb_student")
// N
public class Student {

	@Id
	@GeneratedValue(strategy = GenerationType.IDENTITY)
	@Column(name = "stu_no")
	private Long id;

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

	// 特殊属性
	@ManyToOne(cascade = { CascadeType.ALL }, fetch = FetchType.EAGER)
	@JoinColumn(name = "clazz_id")
	private Clazz clazz;

	public Long getId() {
		return id;
	}

	public void setId(Long id) {
		this.id = id;
	}

	public String getName() {
		return name;
	}

	public void setName(String name) {
		this.name = name;
	}

	public Clazz getClazz() {
		return clazz;
	}

	public void setClazz(Clazz clazz) {
		this.clazz = clazz;
	}

	public Student(Long id, String name) {
		super();
		this.id = id;
		this.name = name;
	}

	public Student(String name) {
		super();
		this.name = name;
	}

	public Student(Long id) {
		super();
		this.id = id;
	}

	public Student() {
		super();
	}

	@Override
	public String toString() {
		return "Student [id=" + id + ", name=" + name + "]";
	}

}
```

## Clazz.java

```
package online.qsx.model;

import javax.persistence.Column;
import javax.persistence.Entity;
import javax.persistence.GeneratedValue;
import javax.persistence.GenerationType;
import javax.persistence.Id;
import javax.persistence.Table;
```

```
@Entity
@Table(name = "tb_clazz")
// 1
public class Clazz {

	@Id
	@GeneratedValue(strategy = GenerationType.IDENTITY)
	@Column(name = "clazz_id")
	private Long id;

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

	public Long getId() {
		return id;
	}

	public void setId(Long id) {
		this.id = id;
	}

	public String getName() {
		return name;
	}

	public void setName(String name) {
		this.name = name;
	}

	public Clazz(Long id, String name) {
		super();
		this.id = id;
		this.name = name;
	}

	public Clazz(String name) {
		super();
		this.name = name;
	}

	public Clazz(Long id) {
		super();
		this.id = id;
```

```java
	}

	public Clazz() {
		super();
	}

	@Override
	public String toString() {
		return "Clazz [id=" + id + ", name=" + name + "]";
	}
}
```

**Test.java**

```java
package online.qsx.test;

import org.hibernate.Session;
import org.hibernate.SessionFactory;
import org.hibernate.Transaction;
import org.hibernate.boot.registry.StandardServiceRegistry;
import org.hibernate.boot.registry.StandardServiceRegistryBuilder;
import org.hibernate.cfg.Configuration;

import online.qsx.model.Clazz;
import online.qsx.model.Student;

public class Test {
	SessionFactory sf = null;
	Session session = null;
	Transaction transaction = null;

	/**
	 * 开启 hibernate 连接
	 */
	public void init() {
		// 加载配置文件
		Configuration configuration = new Configuration();
		configuration.configure("hibernate.cfg.xml");
		// 注册标准服务
		StandardServiceRegistryBuilder ssrb = new StandardServiceRegistryBuilder();
		StandardServiceRegistry ssr = ssrb.applySettings(configuration.getProperties()).build();
		// 通过标准服务加载配置文件后获得会话工厂
		sf = configuration.buildSessionFactory(ssr);// 二级缓存
		// 开启一个会话
		session = sf.openSession();// 一级缓存
		// 开启事物
		transaction = session.beginTransaction();
		// 操作
		System.out.println("连接开启成功");
	}

	/**
	 * 关闭 hibernate 连接
	 */
	public void destroy() {
		// 提交事物
		transaction.commit();
		// 关闭
		session.close();
		sf.close();
		System.out.println("连接关闭成功");
	}

	/**
	 * 级联添加
	 */
	public void save() {
		init();
		Student stu=new Student("张三");
		stu.setClazz(new Clazz("大四"));
		session.save(stu);
		destroy();
	}



	public static void main(String[] args) {
		Test test = new Test();
		test.save();
	}
}
```

## 懒加载,立即加载

### Test.java and Clazz.java

懒加载 fetch = FetchType.LAZY

```
    // 特殊属性
    // 1 : N
    // fetch 控制 查询
    @OneToMany(fetch = FetchType.LAZY)
    @JoinColumn(name = "clazz_id")
    private Set<Student> students = new HashSet<Student>();
    /**
     * 懒加载  fetch = FetchType.LAZY
     */
    public void getClazz(){
        init();
        Clazz clazz=(Clazz)session.get(Clazz.class, 4L);
        System.out.println(clazz.toStringAndStudents());
        destroy();
    }
Hibernate: 
    select
        clazz0_.clazz_id as clazz_id1_0_0_,
        clazz0_.clazz_name as clazz_na2_0_0_ 
    from
        tb_clazz clazz0_ 
    where
        clazz0_.clazz_id=?
Hibernate: 
    select
        students0_.clazz_id as clazz_id3_0_0_,
        students0_.stu_no as stu_no1_1_0_,
        students0_.stu_no as stu_no1_1_1_,
        students0_.stu_name as stu_name2_1_1_ 
    from
        tb_student students0_ 
    where
        students0_.clazz_id=?
```

立即加载 fetch = FetchType.EAGER

```
    // 特殊属性
    // 1 : N
    // fetch 控制 查询
    @OneToMany(fetch = FetchType.EAGER)
    @JoinColumn(name = "clazz_id")
    private Set<Student> students = new HashSet<Student>();
    /**
     * 立即加载 fetch = FetchType.EAGER
     */
    public void getClazz(){
        init();
        Clazz clazz=(Clazz)session.get(Clazz.class, 4L);
        System.out.println(clazz.toStringAndStudents());
        destroy();
    }
Hibernate:
    select
        clazz0_.clazz_id as clazz_id1_0_0_,
        clazz0_.clazz_name as clazz_na2_0_0_,
        students1_.clazz_id as clazz_id3_0_1_,
        students1_.stu_no as stu_no1_1_1_,
        students1_.stu_no as stu_no1_1_2_,
        students1_.stu_name as stu_name2_1_2_
    from
        tb_clazz clazz0_
    left outer join
        tb_student students1_
            on clazz0_.clazz_id=students1_.clazz_id
    where
        clazz0_.clazz_id=?
```

## 一级缓存

## 数据来源走 session 缓存

```
/**
     * 查询的数据会存放到session中
     * 每次查询如果条件不变，一般先查session缓存，
     * 存在就不会发送SQL直接出数据，
     * 不存在才会去发送SQL查询结果，并把结果放置到session缓存
     */
    public void getClazz() {
        init();
        Clazz clazz1 = (Clazz) session.get(Clazz.class, 5L);
        System.out.println(clazz1.toStringAndStudents());

        Clazz clazz2 = (Clazz) session.get(Clazz.class, 5L);
        System.out.println(clazz2.toStringAndStudents());
        destroy();
    }
Hibernate: 
    select
        clazz0_.clazz_id as clazz_id1_0_0_,
        clazz0_.clazz_name as clazz_na2_0_0_,
        students1_.clazz_id as clazz_id3_0_1_,
        students1_.stu_no as stu_no1_1_1_,
        students1_.stu_no as stu_no1_1_2_,
        students1_.stu_name as stu_name2_1_2_ 
    from
        tb_clazz clazz0_ 
    left outer join
        tb_student students1_ 
            on clazz0_.clazz_id=students1_.clazz_id 
    where
        clazz0_.clazz_id=?
Clazz [id=5, name=大一,students=[Student [id=17, name=李四], Student [id=19, name=张三], Student [id=18, name=王五], Student [id=20, name=马六]]]
Clazz [id=5, name=大一,students=[Student [id=17, name=李四], Student [id=19, name=张三], Student [id=18, name=王五], Student [id=20, name=马六]]]
```

## 数据来源不走 session 缓存

```
    /**
     * 查询的数据会存放到session中
     * 每次查询如果条件不变，一般先查session缓存，
     * 存在就不会发送SQL直接出数据，
     * 不存在才会去发送SQL查询结果，并把结果放置到session缓存
     */
    public void getClazz() {
        init();
        Clazz clazz1 = (Clazz) session.get(Clazz.class, 5L);
        System.out.println(clazz1.toStringAndStudents());

        Clazz clazz2 = (Clazz) session.get(Clazz.class, 6L);
        System.out.println(clazz2.toStringAndStudents());
        destroy();
```

```
	}
Hibernate: 
	select
		clazz0_.clazz_id as clazz_id1_0_0_,
		clazz0_.clazz_name as clazz_na2_0_0_,
		students1_.clazz_id as clazz_id3_0_1_,
		students1_.stu_no as stu_no1_1_1_,
		students1_.stu_no as stu_no1_1_2_,
		students1_.stu_name as stu_name2_1_2_ 
	from
		tb_clazz clazz0_ 
	left outer join
		tb_student students1_ 
			on clazz0_.clazz_id=students1_.clazz_id 
	where
		clazz0_.clazz_id=?
Clazz [id=5, name=大一,students=[Student [id=17, name=李四], Student [id=19, name=张三], Student [id=18, name=王五], Student [id=20, name=马六]]]
Hibernate: 
	select
		clazz0_.clazz_id as clazz_id1_0_0_,
		clazz0_.clazz_name as clazz_na2_0_0_,
		students1_.clazz_id as clazz_id3_0_1_,
		students1_.stu_no as stu_no1_1_1_,
		students1_.stu_no as stu_no1_1_2_,
		students1_.stu_name as stu_name2_1_2_ 
	from
		tb_clazz clazz0_ 
	left outer join
		tb_student students1_ 
			on clazz0_.clazz_id=students1_.clazz_id 
	where
		clazz0_.clazz_id=?
Clazz [id=6, name=大二,students=[Student [id=22, name=张三], Student [id=23, name=马六], Student [id=21, name=李四], Student [id=24, name=王五]]]
```

## 级联关系

### Student.java

```
package online.qsx.model;
```

```
import javax.persistence.Column;
import javax.persistence.Entity;
import javax.persistence.GeneratedValue;
import javax.persistence.GenerationType;
import javax.persistence.Id;
import javax.persistence.Table;

@Entity
@Table(name = "tb_student")
public class Student {

	@Id
	@GeneratedValue(strategy = GenerationType.IDENTITY)
	@Column(name = "stu_no")
	private Long id;

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

	public Long getId() {
		return id;
	}

	public void setId(Long id) {
		this.id = id;
	}

	public String getName() {
		return name;
	}

	public void setName(String name) {
		this.name = name;
	}

	public Student(Long id, String name) {
		super();
		this.id = id;
		this.name = name;
	}

	public Student(String name) {
		super();
		this.name = name;
	}

	public Student(Long id) {
		super();
		this.id = id;
	}

	public Student() {
		super();
	}

	@Override
	public String toString() {
		return "Student [id=" + id + ", name=" + name + "]";
	}

}
```

## Clazz.java

```
package online.qsx.model;

import java.util.HashSet;
import java.util.Set;

import javax.persistence.CascadeType;
import javax.persistence.Column;
import javax.persistence.Entity;
import javax.persistence.FetchType;
import javax.persistence.GeneratedValue;
import javax.persistence.GenerationType;
import javax.persistence.Id;
import javax.persistence.JoinColumn;
import javax.persistence.OneToMany;
import javax.persistence.Table;

@Entity
@Table(name = "tb_clazz")
public class Clazz {

	@Id
```

```
@GeneratedValue(strategy = GenerationType.IDENTITY)
@Column(name = "clazz_id")
private Long id;

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

//  特殊属性
// 1 : N
// cascade  控制  添加,删除,修改
@OneToMany(cascade = { CascadeType.ALL })
@JoinColumn(name = "clazz_id")
private Set<Student> students = new HashSet<Student>();

public Long getId() {
        return id;
}

public void setId(Long id) {
        this.id = id;
}

public String getName() {
        return name;
}

public void setName(String name) {
        this.name = name;
}

public Set<Student> getStudents() {
        return students;
}

public void setStudents(Set<Student> students) {
        this.students = students;
}

public Clazz(Long id, String name) {
        super();
        this.id = id;
        this.name = name;
}
```

```
	public Clazz(String name) {
		super();
		this.name = name;
	}

	public Clazz(Long id) {
		super();
		this.id = id;
	}

	public Clazz() {
		super();
	}

	@Override
	public String toString() {
		return "Clazz [id=" + id + ", name=" + name + "]";
	}

	public String toStringAndStudents() {
		return "Clazz [id=" + id + ", name=" + name + ",students=" + students + "]";
	}

}
```

**Test.java**

```
package online.qsx.test;

import org.hibernate.Session;
import org.hibernate.SessionFactory;
import org.hibernate.Transaction;
import org.hibernate.boot.registry.StandardServiceRegistry;
import org.hibernate.boot.registry.StandardServiceRegistryBuilder;
import org.hibernate.cfg.Configuration;

import online.qsx.model.Clazz;
import online.qsx.model.Student;

public class Test {
    SessionFactory sf = null;
    Session session = null;
    Transaction transaction = null;

    /**
     * 开启hibernate连接
     */
    public void init() {
        // 加载配置文件
        Configuration configuration = new Configuration();
        configuration.configure("hibernate.cfg.xml");
        // 注册标准服务
        StandardServiceRegistryBuilder ssrb = new
StandardServiceRegistryBuilder();
        StandardServiceRegistry ssr =
ssrb.applySettings(configuration.getProperties()).build();
        // 通过标准服务加载配置文件后获得会话工厂
        sf = configuration.buildSessionFactory(ssr);// 二级缓存
        // 开启一个会话
        session = sf.openSession();// 一级缓存
        // 开启事物
        transaction = session.beginTransaction();
        // 操作
        System.out.println("连接开启成功");
    }

    /**
     * 关闭hibernate连接
     */
    public void destroy() {
        // 提交事物
        transaction.commit();
        // 关闭
        session.close();
        sf.close();
        System.out.println("连接关闭成功");
    }

    /**
     * 级联添加
     */
    public void save() {
        init();
        Clazz clazz = new Clazz("大二");
        clazz.getStudents().add(new Student("张三"));
        clazz.getStudents().add(new Student("李四"));
        clazz.getStudents().add(new Student("王五"));
        clazz.getStudents().add(new Student("马六"));
        session.save(clazz);
        destroy();
    }

    public static void main(String[] args) {
        Test test = new Test();
        test.save();
    }
}
```

## 课程作业

平台推送

利用 Hibernate 实现一对多关联映射,使用 Annotation 配置

利用 Hibernate 实现多对一关联映射,使用 Annotation 配置

## 深入 Hibernate 关系映射

## 课程目标

双向一对多/多对一关系映射

代码演示

**User.java**

```
@Entity
@Table(name = "t_user") //1
public class User {
    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    private Long id;

    private String username;

    private String password;

    @Temporal(TemporalType.DATE)
    private Date createDate;

    //特殊属性
    //一对多
    @OneToMany(fetch=FetchType.LAZY,cascade=CascadeType.ALL)
    @JoinColumn(name="user_id")
    private Set<Order> orders=new HashSet<Order>();
```

**Order.java**

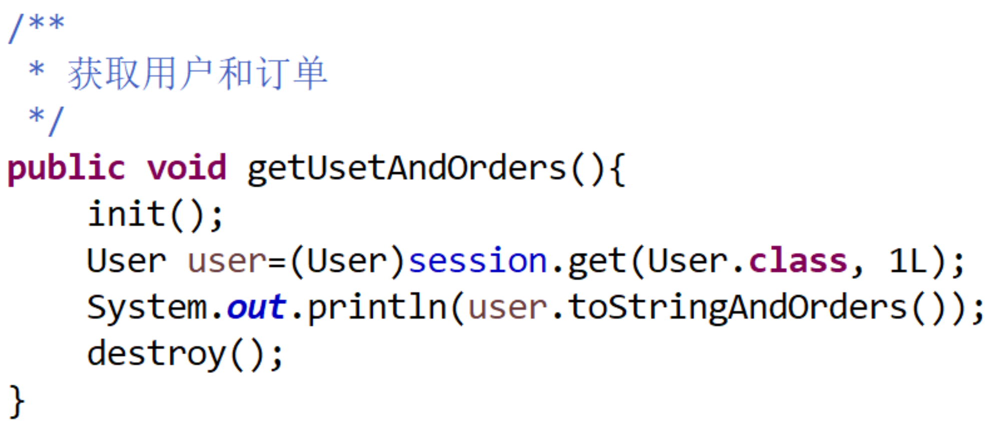
```
@Entity
@Table(name = "t_order") // N
public class Order {
    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    private Long id;

    private String code;

    @Temporal(TemporalType.DATE)
    private Date createDate;

    //特殊属性
    //多对一
    @ManyToOne(fetch=FetchType.EAGER,cascade=CascadeType.ALL)
    @JoinColumn(name="user_id")
    private User user;
```

**Test.java**

```java
/**
 * 级联添加 用户和订单列表
 */
public void saveUserAndOrders(){
    init();
    User user=new User("arvin","123456",new Date());
    user.getOrders().add(new Order("xxx10001",new Date()));
    user.getOrders().add(new Order("xxx10005",new Date()));
    user.getOrders().add(new Order("xxx10006",new Date()));
    user.getOrders().add(new Order("xxx10007",new Date()));
    user.getOrders().add(new Order("xxx10008",new Date()));


    session.save(user);
    destroy();
}
```

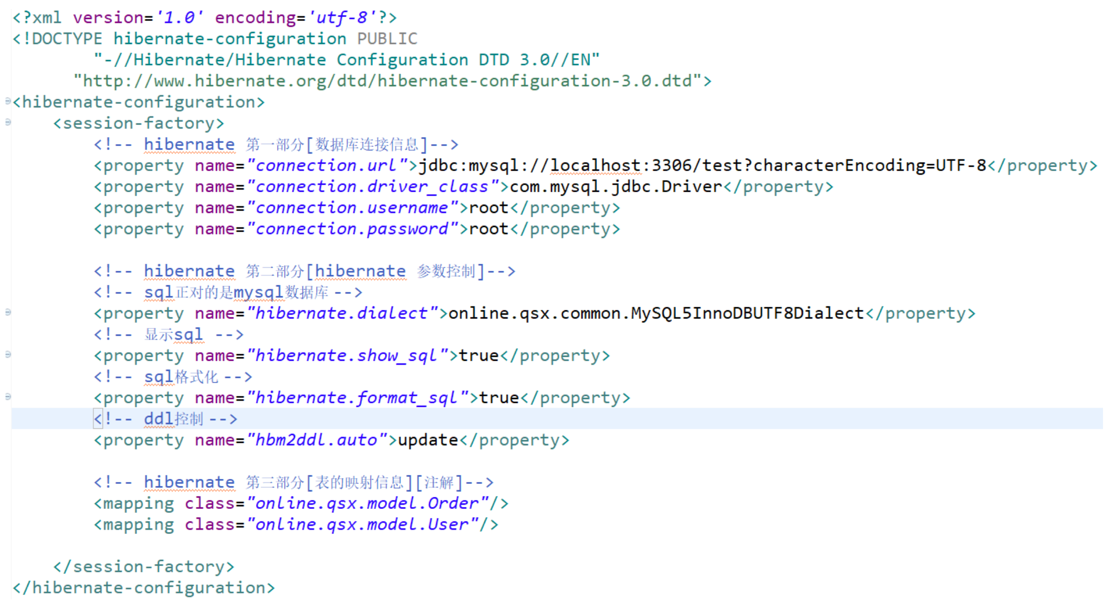
```java
/**
 * 级联添加 订单和用户
 */
public void saveOrderAndUser(){
    init();

    Order order=new Order("xxxx200001",new Date());
    order.setUser(new User("jack", "123456",new Date()));

    session.save(order);

    destroy();
}
```

```java
/**
 * 获取订单和用户
 */
public void getOrderAndUser(){
    init();
    Order order=(Order)session.get(Order.class, 6L);
    destroy();
    System.out.println(order.toStringAndUser());
}
```



```java
/**
 * 获取用户和订单
 */
public void getUsetAndOrders(){
    init();
    User user=(User)session.get(User.class, 1L);
    System.out.println(user.toStringAndOrders());
    destroy();
}
```

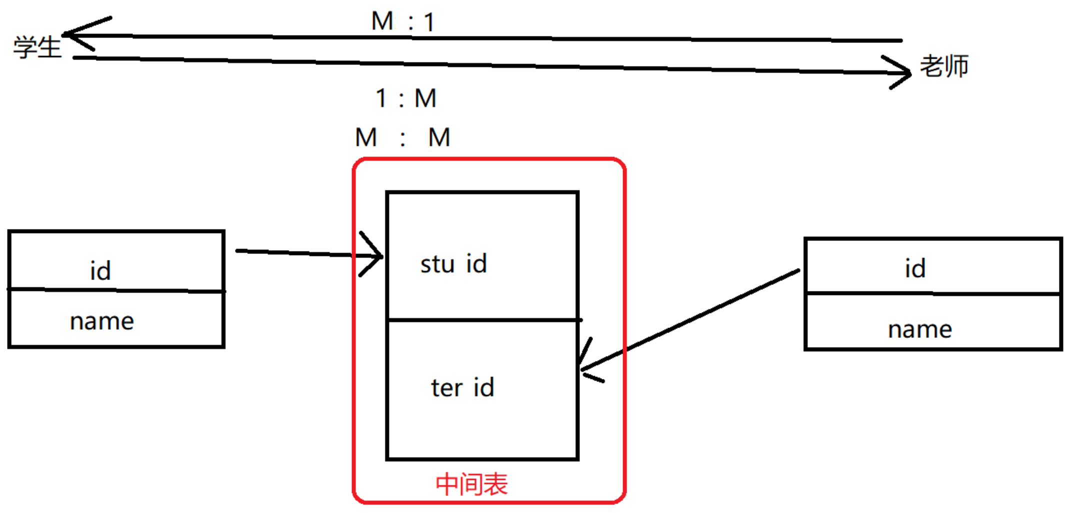
## Hibernate.cfg.xml



```xml
<?xml version='1.0' encoding='utf-8'?>
<!DOCTYPE hibernate-configuration PUBLIC
        "-//Hibernate/Hibernate Configuration DTD 3.0//EN"
      "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">
<hibernate-configuration>
    <session-factory>
        <!-- hibernate 第一部分[数据库连接信息]-->
        <property name="connection.url">jdbc:mysql://localhost:3306/test?characterEncoding=UTF-8</property>
        <property name="connection.driver_class">com.mysql.jdbc.Driver</property>
        <property name="connection.username">root</property>
        <property name="connection.password">root</property>

        <!-- hibernate 第二部分[hibernate 参数控制]-->
        <!-- sql正对的是mysql数据库 -->
        <property name="hibernate.dialect">online.qsx.common.MySQL5InnoDBUTF8Dialect</property>
        <!-- 显示sql -->
        <property name="hibernate.show_sql">true</property>
        <!-- sql格式化 -->
        <property name="hibernate.format_sql">true</property>
        <!-- ddl控制 -->
        <property name="hbm2ddl.auto">update</property>

        <!-- hibernate 第三部分[表的映射信息][注解]-->
        <mapping class="online.qsx.model.Order"/>
        <mapping class="online.qsx.model.User"/>

    </session-factory>
</hibernate-configuration>
```

## 多对多关系映射

### 图解



### 代码演示

#### Student.java

```
package online.qsx.model;

import java.util.HashSet;
import java.util.Set;

import javax.persistence.CascadeType;
import javax.persistence.Column;
import javax.persistence.Entity;
import javax.persistence.FetchType;
import javax.persistence.GeneratedValue;
import javax.persistence.GenerationType;
import javax.persistence.Id;
import javax.persistence.JoinColumn;
import javax.persistence.JoinTable;
import javax.persistence.ManyToMany;
import javax.persistence.Table;

@Entity
@Table(name = "tb_student")
public class Student {
```

```
@Id
@GeneratedValue(strategy = GenerationType.IDENTITY)
@Column(name = "stu_id")
private Long id;

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

// 特殊属性
@ManyToMany(cascade=CascadeType.ALL,fetch=FetchType.LAZY)
@JoinTable(
        name = "tb_temp", // 中间表的表名
        joinColumns = {
                @JoinColumn(name = "stu_id")   //关联列
        },
        inverseJoinColumns = {
                @JoinColumn(name = "tea_id")   //其他列
        }
)
private Set<Teacher> teachers = new HashSet<Teacher>();

public Long getId() {
    return id;
}

public void setId(Long id) {
    this.id = id;
}

public String getName() {
    return name;
}

public void setName(String name) {
    this.name = name;
}

public Set<Teacher> getTeachers() {
    return teachers;
}

public void setTeachers(Set<Teacher> teachers) {
    this.teachers = teachers;
}
```

```
	@Override
	public String toString() {
		return "Student [id=" + id + ", name=" + name + "]";
	}

	public String toStringAndTeachers() {
		return "Student [id=" + id + ", name=" + name + ",teachers="+teachers+"]";
	}

	public Student(String name) {
		super();
		this.name = name;
	}

	public Student(Long id) {
		super();
		this.id = id;
	}

	public Student() {
		super();
	}

}
```

**Teacher.java**

```
package online.qsx.model;

import java.util.HashSet;
import java.util.Set;

import javax.persistence.CascadeType;
import javax.persistence.Column;
import javax.persistence.Entity;
import javax.persistence.FetchType;
import javax.persistence.GeneratedValue;
import javax.persistence.GenerationType;
import javax.persistence.Id;
import javax.persistence.JoinColumn;
import javax.persistence.JoinTable;
import javax.persistence.ManyToMany;
import javax.persistence.Table;
```

```
@Entity
@Table(name = "tb_teacher")
public class Teacher {
	@Id
	@GeneratedValue(strategy = GenerationType.IDENTITY)
	@Column(name = "tea_id")
	private Long id;

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

	// 特殊属性
	@ManyToMany(cascade=CascadeType.ALL,fetch=FetchType.EAGER)
	@JoinTable(
			name = "tb_temp", //  中间表的表名
			joinColumns = {
					@JoinColumn(name = "tea_id")   //关联列
			},
			inverseJoinColumns = {
					@JoinColumn(name = "stu_id")   //其他列
			}
	)
	private Set<Student> students = new HashSet<Student>();

	public Long getId() {
		return id;
	}

	public void setId(Long id) {
		this.id = id;
	}

	public String getName() {
		return name;
	}

	public void setName(String name) {
		this.name = name;
	}

	public Set<Student> getStudents() {
		return students;
	}
	public void setStudents(Set<Student> students) {
		this.students = students;
	}

	@Override
	public String toString() {
		return "Teacher [id=" + id + ", name=" + name + "]";
	}



	public String toStringAndStudents() {
		return "Teacher [id=" + id + ", name=" + name + ",students="+students+"]";
	}



	public Teacher(String name) {
		super();
		this.name = name;
	}

	public Teacher(Long id) {
		super();
		this.id = id;
	}

	public Teacher() {
		super();
	}

}
```

**Test.java**

```
package online.qsx.test;

import org.hibernate.Session;
import org.hibernate.SessionFactory;
import org.hibernate.Transaction;
import org.hibernate.boot.registry.StandardServiceRegistry;
import org.hibernate.boot.registry.StandardServiceRegistryBuilder;
import org.hibernate.cfg.Configuration;

import online.qsx.model.Student;
import online.qsx.model.Teacher;

public class Test {
	SessionFactory sf = null;
	Session session = null;
	Transaction transaction = null;

	/**
	 * 开启 hibernate 连接
	 */
	public void init() {
		// 加载配置文件
		Configuration configuration = new Configuration();
		configuration.configure("hibernate.cfg.xml");
		// 注册标准服务
		StandardServiceRegistryBuilder ssrb = new StandardServiceRegistryBuilder();
		StandardServiceRegistry ssr = ssrb.applySettings(configuration.getProperties()).build();
		// 通过标准服务加载配置文件后获得会话工厂
		sf = configuration.buildSessionFactory(ssr);// 二级缓存
		// 开启一个会话
		session = sf.openSession();// 一级缓存
		// 开启事物
		transaction = session.beginTransaction();
		// 操作
		System.out.println("连接开启成功");
	}

	/**
	 * 关闭 hibernate 连接
	 */
	public void destroy() {
		// 提交事物
		transaction.commit();
		// 关闭
		session.close();
		sf.close();
		System.out.println("连接关闭成功");
	}

	/**
	 * 构建表结构
	 */
	public void createTables(){
		init();
```

```
        System.out.println("构建表结构");
        destroy();
    }

    /**
     * 添加一个学生同时添加多个老师
     */
    public void saveStudentAndTeachers(){
        init();

        Student student=new Student("张三");
        student.getTeachers().add(new Teacher("aaaaa-张三"));
        student.getTeachers().add(new Teacher("bbbbb-张三"));

        session.save(student);
        destroy();
    }

    /**
     * 添加一个学生同时添加多个老师
     */
    public void saveTeacherAndStudents(){
        init();
        Teacher teacher=new Teacher("李四");
        teacher.getStudents().add(new Student("ccccc-李四"));
        teacher.getStudents().add(new Student("ddddd-李四"));
        session.save(teacher);
        destroy();
    }

    /**
     * 查询一个老师及对应的所有学生
     */
    public void getTeacherAndStudents(){
        init();
        Teacher teacher=(Teacher)session.get(Teacher.class, 1L);
        System.out.println(teacher.toStringAndStudents());
        destroy();
    }

    /**
     * 查询一个学生及对应的所有老师
     */
    public void getStudentAndTeachers(){
```

```
		init();
		Student student=(Student)session.get(Student.class, 1L);
		System.out.println(student.toStringAndTeachers());
		destroy();
	}

	public static void main(String[] args) {
		Test test = new Test();
		test.getStudentAndTeachers();
	}
}
```

**Hibernate.cfg.xml**

```
<?xml version='1.0' encoding='utf-8'?>
<!DOCTYPE hibernate-configuration PUBLIC
        "-//Hibernate/Hibernate Configuration DTD 3.0//EN"
      "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">
<hibernate-configuration>
    <session-factory>
        <!-- hibernate 第一部分[数据库连接信息]-->
        <property
name="connection.url">jdbc:mysql://localhost:3306/test?characterEnco
ding=UTF-8</property>
        <property
name="connection.driver_class">com.mysql.jdbc.Driver</property>
        <property name="connection.username">root</property>
        <property name="connection.password">root</property>

        <!-- hibernate 第二部分[hibernate 参数控制]-->
        <!-- sql正对的是mysql数据库 -->
        <property
name="hibernate.dialect">online.qsx.common.MySQL5InnoDBUTF8Dialect</
property>
        <!-- 显示sql -->
        <property name="hibernate.show_sql">true</property>
        <!-- sql格式化 -->
        <property name="hibernate.format_sql">true</property>
        <!-- ddl控制 -->
        <property name="hbm2ddl.auto">update</property>

        <!-- hibernate 第三部分[表的映射信息][注解]-->
        <mapping class="online.qsx.model.Student"/>
        <mapping class="online.qsx.model.Teacher"/>
    </session-factory>
</hibernate-configuration>
```

**MySQL5InnoDBUTF8Dialect.java**

```
package online.qsx.common;

import org.hibernate.dialect.MySQL5Dialect;

public class MySQL5InnoDBUTF8Dialect extends MySQL5Dialect {

    @Override
    public String getTableTypeString() {
        return "ENGINE=InnoDB CHARSET=utf8";
    }

}
```

## 一对一关系映射**[扩展][自学]**

## 课程作业

### 平台推送

**利用 Hibernate 实现多对多关联映射,使用 Annotation 配置**

**利用 Hibernate 实现一对一关联映射,使用 Annotation 配置**

# 深入 Hibernate HQL 查询,DQL 优化

## 课程目标

### List

```
    /**
```

```
     * 获取用户和订单
     */
    public void getUsersAndOrders() {
        init();

        // HQL--->SQL
        Query query = session.createQuery("from User");
        List<User> list = query.list();
        for (User temp : list) {
            System.out.println(temp.toStringAndOrders());
        }
        destroy();
    }
```

## Iterate

```
    /**
     * 获取用户和订单
     */
    public void getUsersAndOrders() {
        init();

        // HQL--->SQL
        Query query = session.createQuery("from User");

        // 一条一条的查询，缓存中有就读取缓存
        Iterator<User> iterator = query.iterate();
        while (iterator.hasNext()) {
            User user = iterator.next();
            System.out.println(user.toStringAndOrders());
        }

        destroy();
    }
```

## 一级缓存

## 初始 HQL 语法

### 基础 HQL

Query query = session.createQuery("from User");

### 条件 HQL

#### 占位符

```
Query query = session.createQuery("from User where id>=? and username
like ? ");
query.setLong(0, 5);
query.setString(1,"%5%");
```

#### 别名

```
Query query = session.createQuery("from User where id>= :id and username
like :username ");
query.setLong("id", 5);
query.setString("username","%5%");
```

## 深入 HQL 分页

```
Query query = session.createQuery("from User where id>=? ");
query.setLong(0, 5);

// 分页
query.setMaxResults(3); // 每页显示的数据条数
query.setFirstResult((3 - 1) * 3); // 越过的查询数据条数
```

## 深入 HQL 实现子查询

```
Query query=session.createQuery(
"
    from Order o where o.user.id=(
       select u.id from User u where u.username='arvin'
    )
 ");
List<Order> list=query.list();
```

## 深入 HQL 链接查询

### inner join

```
    public void inner_join(){
        init();
        Query query=session.createQuery("from User u inner join 
u.orders");
        List<Object[]> list=query.list();
        
        for (Object[] objects : list) {
            for (Object object : objects) {
                if(object instanceof User){
                    User user=(User) object;
                    System.out.println(user.toString());
                }else if(object instanceof Order){
                    Order order=(Order) object;
                    System.out.println(order.toString());
                }
            }
        }
        destroy();
    }
```

### left join

```
public void left_join(){
        init();
        Query query=session.createQuery("from User u left join 
u.orders");
        List<Object[]> list=query.list();
        for (Object[] objects : list) {
            for (Object object : objects) {
                if(object instanceof User){
                    User user=(User) object;
                    System.out.println(user.toString());
                }else if(object instanceof Order){
                    Order order=(Order) object;
                    System.out.println(order.toString());
                }
            }
        }
        destroy();
    }
```

**right join**

```
public void right_join(){
        init();
        Query query=session.createQuery("from User u right join
u.orders");
        List<Object[]> list=query.list();

        for (Object[] objects : list) {
            for (Object object : objects) {
                if(object instanceof User){
                    User user=(User) object;
                    System.out.println(user.toString());
                }else if(object instanceof Order){
                    Order order=(Order) object;
                    System.out.println(order.toString());
                }
            }
        }
        destroy();
    }
```

## 深入 HQL 追切链接查询

### inner join fetch

```
public void inner_join_fetch(){
        init();
        Query query=session.createQuery("from User u inner join fetch 
u.orders");
        List<User> list=query.list();
        for (User user : list) {
            System.out.println(user.toStringAndOrders());
        }
        destroy();
    }
```

### left join fetch

```
public void left_join_fetch(){
        init();
        Query query=session.createQuery("from User u left join fetch 
u.orders");
        List<User> list=query.list();
        for (User user : list) {
            System.out.println(user.toStringAndOrders());
        }
        destroy();
    }
```

### right join fetch

```
public void right_join_fetch(){
        init();
        Query query=session.createQuery("from User u right join fetch 
u.orders");
        List<User> list=query.list();
        for (User user : list) {
            System.out.println(user.toStringAndOrders());
        }
        destroy();
```

```
    }
```

## 命名 HQL

### User.java

```
@Entity
@Table(name = "t_user") //1
@NamedQueries(value={
       @NamedQuery(name="findListById",query="from User where id>=?"),
       @NamedQuery(name="findListByIdAndUserName",query="from User
where id>= :id and username like :name")
})
public class User {
   @Id
   @GeneratedValue(strategy = GenerationType.IDENTITY)
   private Long id;

   private String username;

   private String password;

   @Temporal(TemporalType.DATE)
   private Date createDate;
}
```

### Test.java

```
    /**
     * 获取用户和订单
     */
    public void getUsersAndOrders() {
        init();

        Query query =session.getNamedQuery("findListByIdAndUserName");
        query.setLong("id", 5);
        query.setString("name", "%5%");

        List<User> list = query.list();
        for (User temp : list) {
            System.out.println(temp.toStringAndOrders());
        }

        destroy();
    }
```

## 课程作业

### 平台推送

**利用 Hibernate HQL 技术实现商品信息查询**

**利用 Hibernate HQL 技术实现带条件的商品信息查询**

**利用 Hibernate HQL 技术实现分页商品信息查询**

**利用 Hibernate HQL 实现子查询**

# 深入 Hibernate Criteria 查询,DDL 优化,DML 优化

## 课程目标

### Criteria 条件查询

```
public void find() {
        init();
        Criteria criteria = session.createCriteria(User.class);
        //添加条件
        criteria.add(Restrictions.gt("age", Short.valueOf("20")));
        criteria.add(Restrictions.lt("age", Short.valueOf("40")));
        criteria.add(Restrictions.like("name", "%3%"));
        List<User> list = criteria.list();
        for (User user : list) {
            System.out.println(user);
        }
        destroy();
    }
```

## Criteria 分页查询

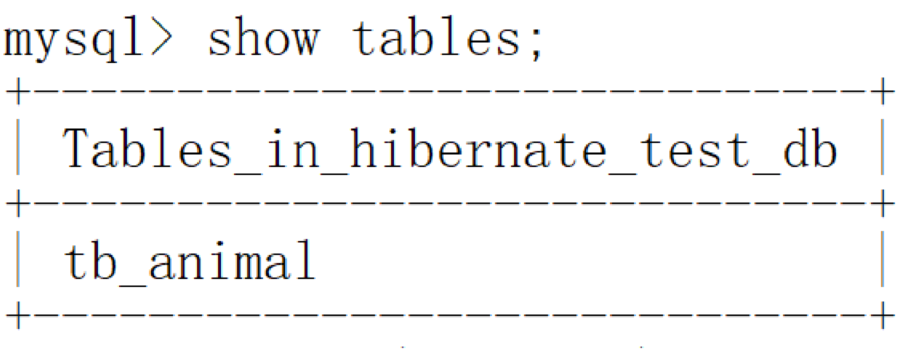
```
public void find() {
        init();
        Criteria criteria = session.createCriteria(User.class);
        //添加条件
        criteria.add(Restrictions.gt("age", Short.valueOf("20")));
        criteria.add(Restrictions.lt("age", Short.valueOf("40")));
        criteria.add(Restrictions.like("name", "%3%"));

        //分页
        criteria.setMaxResults(3);
        criteria.setFirstResult((1-1)*3);

        List<User> list = criteria.list();
        for (User user : list) {
            System.out.println(user);
        }
        destroy();
    }
```

## 表结构生成策略

### InheritanceType.SINGLE_TABLE

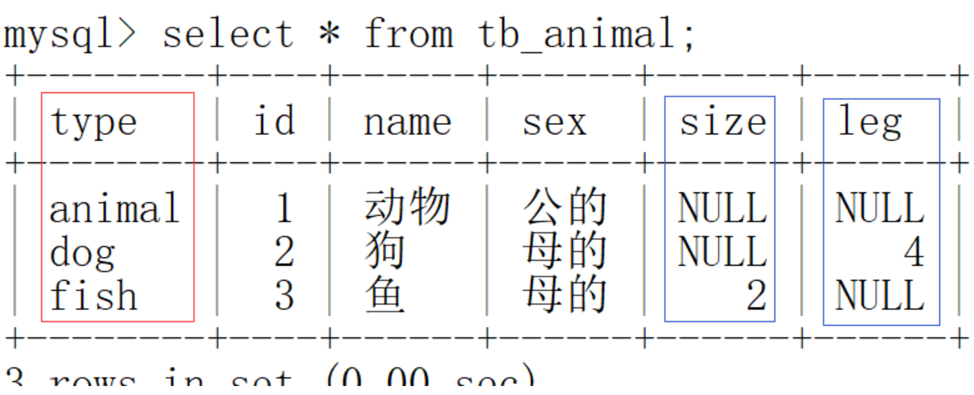
解释：一个表,包含所有信息,依靠关键字区分，父子表[可使用自增]

表结构



```
mysql> show tables;
+-----------------------------+
| Tables_in_hibernate_test_db |
+-----------------------------+
| tb_animal                   |
+-----------------------------+
```

数据结构



```
mysql> select * from tb_animal;
+--------+----+------+------+------+------+
| type   | id | name | sex  | size | leg  |
+--------+----+------+------+------+------+
| animal |  1 | 动物 | 公的 | NULL | NULL |
| dog    |  2 | 狗   | 母的 | NULL |    4 |
| fish   |  3 | 鱼   | 母的 |    2 | NULL |
+--------+----+------+------+------+------+
3 rows in set (0.00 sec)
```

代码

**Animal.java**

```
@Entity
@Table(name = "tb_animal")
@Inheritance(strategy = InheritanceType.SINGLE_TABLE) //一个表
@DiscriminatorColumn(name = "type", discriminatorType =
DiscriminatorType.STRING) //区分各表的关键字，列
@DiscriminatorValue(value = "animal")//当前表的关键字
public class Animal {

    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    private Long id;
    private String name;
    private String sex;
}
```

**Dog.java**

```
@Entity
@DiscriminatorValue(value = "dog")//当前表的关键字
public class Dog extends Animal {
    private Long leg;
}
```

**Fish.java**

```
@Entity
@DiscriminatorValue(value = "fish")//当前表的关键字
public class Fish extends Animal {
    private Long size;
}
```

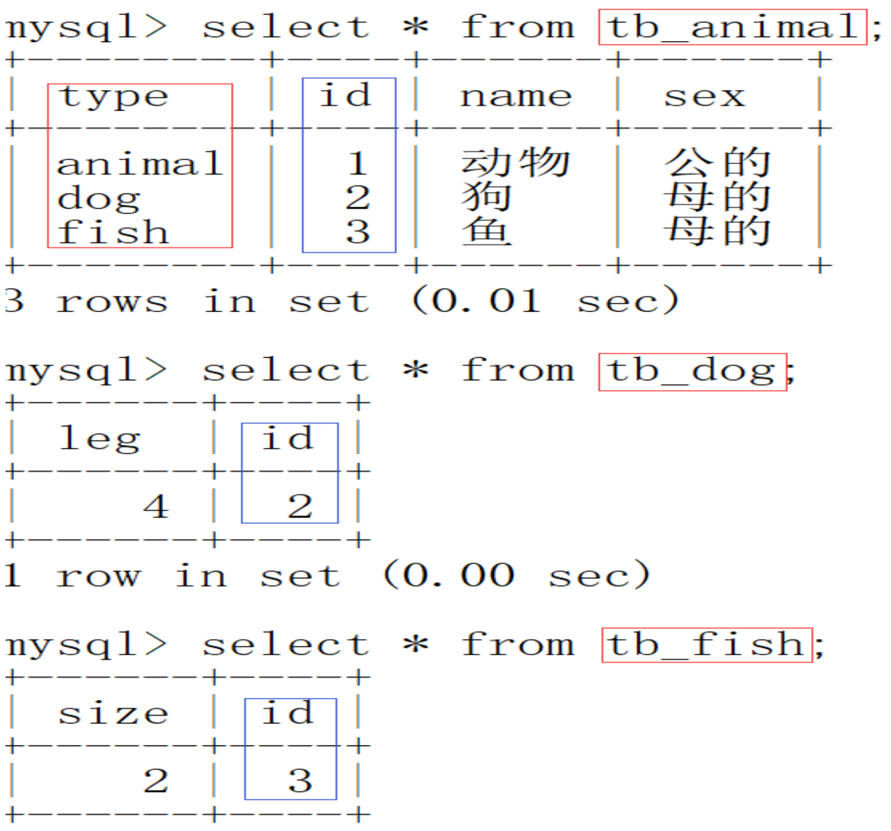
## InheritanceType.JOINED

**解释：父类,之类均有表结构,子表存放特有属性,有一个外键和父表关联[可使用自增]**

**表结构**

```
mysql> desc tb_animal;
+-------+--------------+------+-----+---------+----------------+
| Field | Type         | Null | Key | Default | Extra          |
+-------+--------------+------+-----+---------+----------------+
| type  | varchar(31)  | NO   |     | NULL    |                |
| id    | bigint(20)   | NO   | PRI | NULL    | auto_increment |
| name  | varchar(255) | YES  |     | NULL    |                |
| sex   | varchar(255) | YES  |     | NULL    |                |
+-------+--------------+------+-----+---------+----------------+
4 rows in set (0.01 sec)

mysql> desc tb_dog;
+-------+------------+------+-----+---------+-------+
| Field | Type       | Null | Key | Default | Extra |
+-------+------------+------+-----+---------+-------+
| leg   | bigint(20) | YES  |     | NULL    |       |
| id    | bigint(20) | NO   | PRI | NULL    |       |
+-------+------------+------+-----+---------+-------+
2 rows in set (0.01 sec)

mysql> desc tb_fish;
+-------+------------+------+-----+---------+-------+
| Field | Type       | Null | Key | Default | Extra |
+-------+------------+------+-----+---------+-------+
| size  | bigint(20) | YES  |     | NULL    |       |
| id    | bigint(20) | NO   | PRI | NULL    |       |
+-------+------------+------+-----+---------+-------+
```

**数据结构**



```
mysql> select * from tb_animal;
+--------+----+------+------+
| type   | id | name | sex  |
+--------+----+------+------+
| animal |  1 | 动物 | 公的 |
| dog    |  2 | 狗   | 母的 |
| fish   |  3 | 鱼   | 母的 |
+--------+----+------+------+
3 rows in set (0.01 sec)

mysql> select * from tb_dog;
+-----+----+
| leg | id |
+-----+----+
|   4 |  2 |
+-----+----+
1 row in set (0.00 sec)

mysql> select * from tb_fish;
+------+----+
| size | id |
+------+----+
|    2 |  3 |
+------+----+
```

## 代码

### Animal.java

```
@Entity
@Table(name = "tb_animal")
@Inheritance(strategy = InheritanceType.JOINED) //多个表,子表存放特有属性,有一
个外键和父表关联
@DiscriminatorColumn(name = "type", discriminatorType =
DiscriminatorType.STRING) //区分各表的关键字，列
@DiscriminatorValue(value = "animal")//当前表的关键字
public class Animal {

    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    private Long id;
    private String name;
    private String sex;
}
```

### Dog.java

```
@Entity
@Table(name="tb_dog")
@DiscriminatorValue(value = "dog")//当前表的关键字
public class Dog extends Animal {
    private Long leg;
}
```

### Fish.java

```
@Entity
@Table(name="tb_fish")
@DiscriminatorValue(value = "fish")//当前表的关键字
public class Fish extends Animal {
    private Long size;
}
```

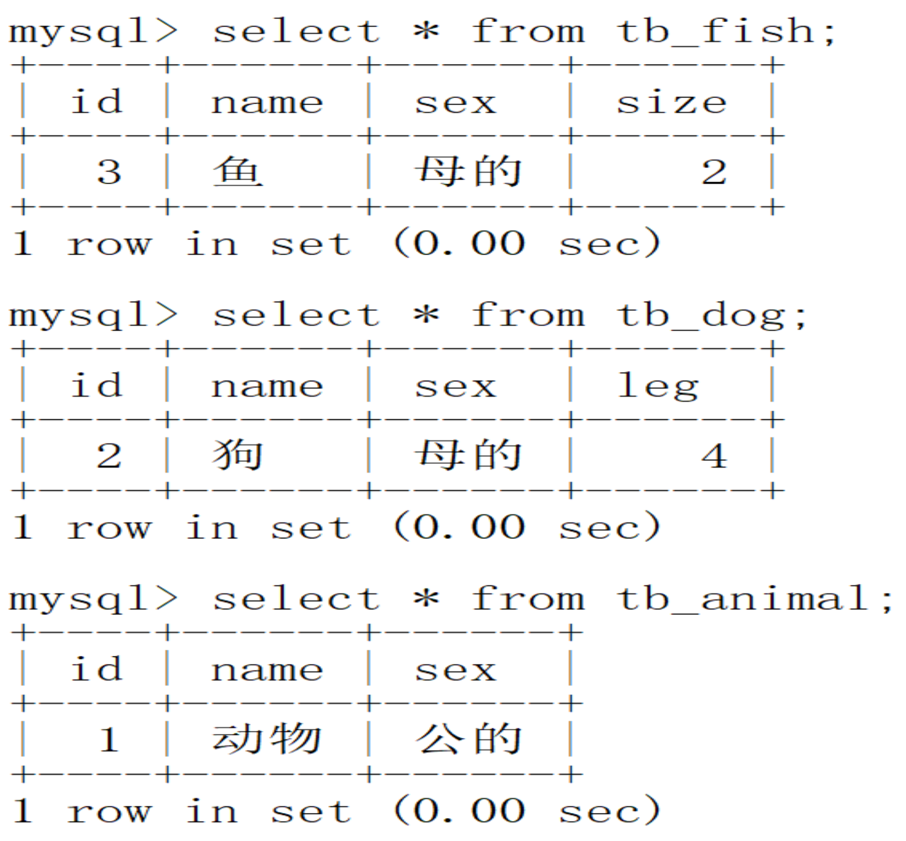
**InheritanceType.TABLE_PER_CLASS**

**解释：父类,子类均有表结构，子表是单独的一个完成表属性被继承到子表中去**
**[不可用自增,且多个表之间 Id 不可重复]**

**表结构**

```
mysql> desc tb_animal;
+-------+--------------+------+-----+---------+-------+
| Field | Type         | Null | Key | Default | Extra |
+-------+--------------+------+-----+---------+-------+
| id    | bigint(20)   | NO   | PRI | NULL    |       |
| name  | varchar(255) | YES  |     | NULL    |       |
| sex   | varchar(255) | YES  |     | NULL    |       |
+-------+--------------+------+-----+---------+-------+

mysql> desc tb_dog;
+-------+--------------+------+-----+---------+-------+
| Field | Type         | Null | Key | Default | Extra |
+-------+--------------+------+-----+---------+-------+
| id    | bigint(20)   | NO   | PRI | NULL    |       |
| name  | varchar(255) | YES  |     | NULL    |       |
| sex   | varchar(255) | YES  |     | NULL    |       |
| leg   | bigint(20)   | YES  |     | NULL    |       |
+-------+--------------+------+-----+---------+-------+

mysql> desc tb_fish;
+-------+--------------+------+-----+---------+-------+
| Field | Type         | Null | Key | Default | Extra |
+-------+--------------+------+-----+---------+-------+
| id    | bigint(20)   | NO   | PRI | NULL    |       |
| name  | varchar(255) | YES  |     | NULL    |       |
| sex   | varchar(255) | YES  |     | NULL    |       |
| size  | bigint(20)   | YES  |     | NULL    |       |
+-------+--------------+------+-----+---------+-------+
```

数据结构



```
mysql> select * from tb_fish;
+----+--------+--------+--------+
| id | name   | sex    | size   |
+----+--------+--------+--------+
|  3 | 鱼     | 母的   |      2 |
+----+--------+--------+--------+
1 row in set (0.00 sec)

mysql> select * from tb_dog;
+----+--------+--------+--------+
| id | name   | sex    | leg    |
+----+--------+--------+--------+
|  2 | 狗     | 母的   |      4 |
+----+--------+--------+--------+
1 row in set (0.00 sec)

mysql> select * from tb_animal;
+----+--------+--------+
| id | name   | sex    |
+----+--------+--------+
|  1 | 动物   | 公的   |
+----+--------+--------+
1 row in set (0.00 sec)
```

代码

**Animal.java**

```java
@Entity
@Table(name = "tb_animal")
@Inheritance(strategy = InheritanceType.TABLE_PER_CLASS) // 指定继承映射的策略
public class Animal {
    @Id
    private Long id;
    private String name;
    private String sex;
}
```

**Dog.java**

```java
@Entity
@Table(name = "tb_dog")
public class Dog extends Animal {
    private Long leg;
}
```

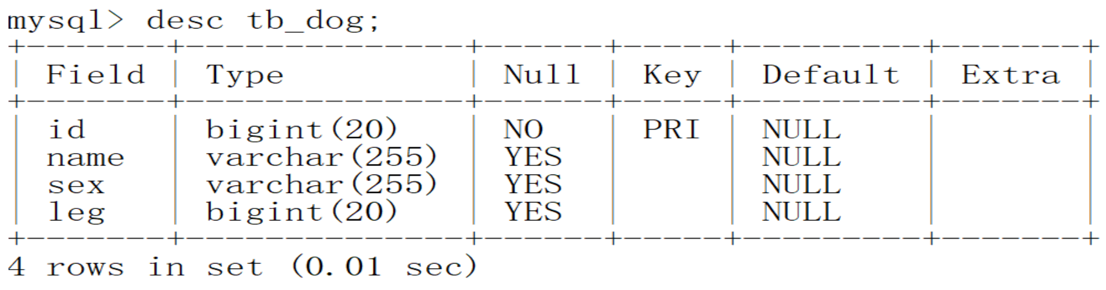
**Fish.java**

```java
@Entity
@Table(name = "tb_fish")
public class Fish extends Animal {
    private Long size;
}
```

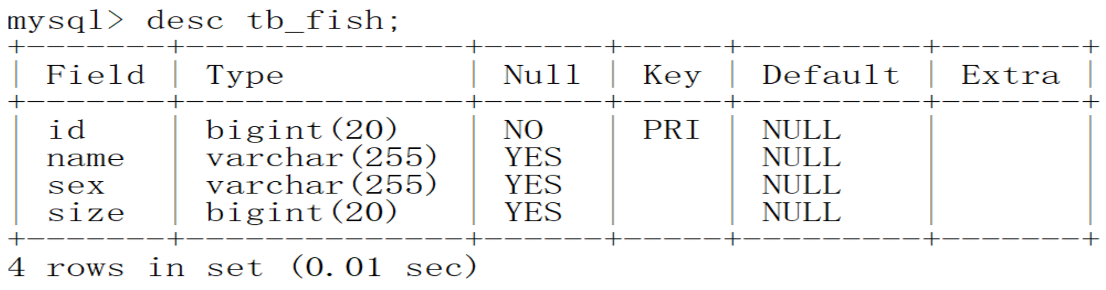
## MappedSuperclass

**解释：父类直接抽象掉,不会构建出表结构,仅存在完整的子表[可使用自增]**

### 表结构

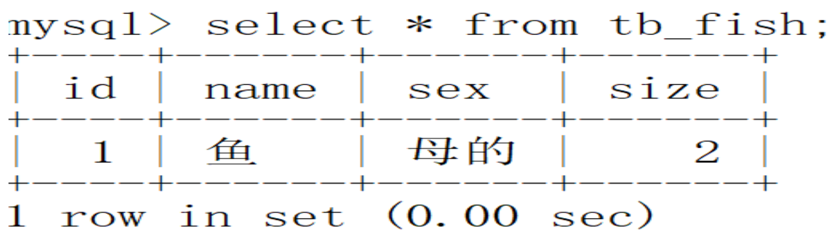


```
mysql> desc tb_dog;
+-------+--------------+------+-----+---------+-------+
| Field | Type         | Null | Key | Default | Extra |
+-------+--------------+------+-----+---------+-------+
| id    | bigint(20)   | NO   | PRI | NULL    |       |
| name  | varchar(255) | YES  |     | NULL    |       |
| sex   | varchar(255) | YES  |     | NULL    |       |
| leg   | bigint(20)   | YES  |     | NULL    |       |
+-------+--------------+------+-----+---------+-------+
4 rows in set (0.01 sec)
```

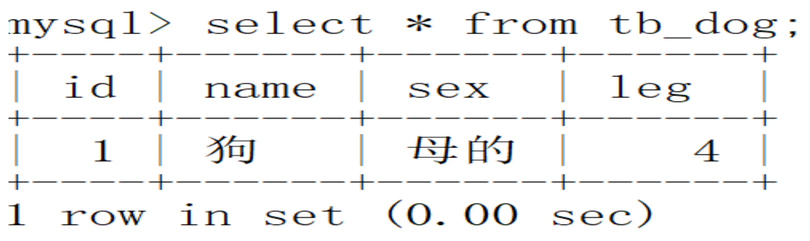


```
mysql> desc tb_fish;
+-------+--------------+------+-----+---------+-------+
| Field | Type         | Null | Key | Default | Extra |
+-------+--------------+------+-----+---------+-------+
| id    | bigint(20)   | NO   | PRI | NULL    |       |
| name  | varchar(255) | YES  |     | NULL    |       |
| sex   | varchar(255) | YES  |     | NULL    |       |
| size  | bigint(20)   | YES  |     | NULL    |       |
+-------+--------------+------+-----+---------+-------+
4 rows in set (0.01 sec)
```

### 数据结构



```
mysql> select * from tb_fish;
+----+------+------+------+
| id | name | sex  | size |
+----+------+------+------+
|  1 | 鱼   | 母的 |    2 |
+----+------+------+------+
1 row in set (0.00 sec)
```



```
mysql> select * from tb_dog;
+----+------+------+------+
| id | name | sex  | leg  |
+----+------+------+------+
|  1 | 狗   | 母的 |    4 |
+----+------+------+------+
1 row in set (0.00 sec)
```

## 代码

**Anmal.java**

```
@MappedSuperclass // 该实体不会被构建成表
public abstract class Animal {
    @Id
    @GeneratedValue(strategy=GenerationType.IDENTITY)
    private Long id;
    private String name;
    private String sex;
}
```

**Dog.java**

```
@Entity
@Table(name = "tb_dog")
public class Dog extends Animal {
    private Long leg;
}
```

**Fish.java**

```
@Entity
@Table(name = "tb_dog")
public class Dog extends Animal {
    private Long leg;
}
```

## hibernate 实现动态 SQL

```
@Entity
@Table(name = "tb_commodity")
@SelectBeforeUpdate(value=true) // 取值为false DynamicUpdate将无效果
@DynamicUpdate // 动态SQl修改,必须先查询,在修改, 修改语句才能动态化
@DynamicInsert // 动态SQl添加
public class Commodity {
    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY) // 主键自增
    private Long id;

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

    @Temporal(TemporalType.DATE)
    private Date createDate;
}
```

## 课程作业

### 非平台推送:

**Day04 HQL 相关练习全部使用 Criteria 实现**

**完成上课案例,实现四种表结构的生成**

## 回顾 Hibernate 历史进程之 XML 解决方案

## 课程目标

### 使用 XML 实现单表映射

**User.java**

```
package online.qsx.model;

import java.util.Date;


public class User {

    private Long id;

    private String name;

    private Short sex;
    private Short age;

    private String phone;

    private Date birthdayDate;

    public Long getId() {
        return id;
    }

    public void setId(Long id) {
        this.id = id;
    }

    public String getName() {
        return name;
    }

    public void setName(String name) {
        this.name = name;
    }

    public Short getSex() {
        return sex;
    }

    public void setSex(Short sex) {
        this.sex = sex;
    }

    public Short getAge() {
        return age;
    }

    public void setAge(Short age) {
        this.age = age;
    }

    public String getPhone() {
        return phone;
    }

    public void setPhone(String phone) {
        this.phone = phone;
    }

    public Date getBirthdayDate() {
        return birthdayDate;
    }

    public void setBirthdayDate(Date birthdayDate) {
        this.birthdayDate = birthdayDate;
    }

    public User(String name, Short sex, Short age, String phone, Date
birthdayDate) {
        super();
        this.name = name;
        this.sex = sex;
        this.age = age;
        this.phone = phone;
        this.birthdayDate = birthdayDate;
    }

    public User(Long id, String name, Short sex, Short age, String phone,
Date birthdayDate) {
        super();
        this.id = id;
        this.name = name;
        this.sex = sex;
        this.age = age;
        this.phone = phone;
        this.birthdayDate = birthdayDate;
    }

    public User(Long id) {
        super();
        this.id = id;
    }

    public User() {
        super();
    }

    @Override
    public String toString() {
        return "User [id=" + id + ", name=" + name + ", sex=" + sex + ",
age=" + age + ", phone=" + phone
              + ", birthdayDate=" + birthdayDate + "]";
    }

}
```

## User.hbm.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE hibernate-mapping PUBLIC
    "-//Hibernate/Hibernate Mapping DTD 3.0//EN"
    "http://www.hibernate.org/dtd/hibernate-mapping-3.0.dtd">
<hibernate-mapping>
    <class name="online.qsx.model.User" table="tb_user">
        <id name="id" column="user_id" type="java.lang.Long">
            <generator class="identity" />
        </id>
        <property name="name" type="java.lang.String">
            <column name="user_name" unique="true" length="20" />
        </property>
        <property name="sex" type="java.lang.Short">
            <column name="user_sex" />
        </property>
        <property name="age" type="java.lang.Short">
            <column name="user_age" />
        </property>
        <property name="phone" type="java.lang.String">
            <column name="user_phone" />
        </property>
        <property name="birthdayDate" type="java.util.Date">
            <column name="user_birthdayDate" />
        </property>
    </class>
</hibernate-mapping>
```

## Hibernate.cfg.xml

```
<?xml version='1.0' encoding='utf-8'?>
<!DOCTYPE hibernate-configuration PUBLIC
        "-//Hibernate/Hibernate Configuration DTD 3.0//EN"
```

```
      "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">
<hibernate-configuration>
    <session-factory>
        <!-- hibernate 第一部分[数据库连接信息]-->
        <property
name="connection.url">jdbc:mysql://localhost:3306/test?characterEnco
ding=UTF-8</property>
        <property
name="connection.driver_class">com.mysql.jdbc.Driver</property>
        <property name="connection.username">root</property>
        <property name="connection.password">root</property>

        <!-- hibernate 第二部分[hibernate 参数控制]-->
        <property
name="hibernate.dialect">online.qsx.common.MySQL5MyISAMUTF8Dialect</
property><!-- sql正对的是mysql数据库 -->
        <property name="hibernate.show_sql">true</property><!-- 显示
sql -->
        <property name="hibernate.format_sql">true</property><!-- sql
格式化 -->
        <property name="hbm2ddl.auto">create</property><!-- ddl控制 -->

        <!-- hibernate 第三部分[表的映射信息][XML]-->
        <mapping resource="online/qsx/model/User.hbm.xml"/>

    </session-factory>
</hibernate-configuration>
```

## 使用 XML 实现单向一对多

### User.java

```
package online.qsx.model;

import java.util.Date;
import java.util.HashSet;
import java.util.Set;

public class User {
```

```
private Long id;

private String name;

private Short sex;

private Short age;

private String phone;

private Date birthdayDate;

//一对多
private Set<Order> orders = new HashSet<Order>();

public Set<Order> getOrders() {
	return orders;
}

public void setOrders(Set<Order> orders) {
	this.orders = orders;
}

public Long getId() {
	return id;
}

public void setId(Long id) {
	this.id = id;
}

public String getName() {
	return name;
}

public void setName(String name) {
	this.name = name;
}

public Short getSex() {
	return sex;
}
```

```
	public void setSex(Short sex) {
		this.sex = sex;
	}

	public Short getAge() {
		return age;
	}

	public void setAge(Short age) {
		this.age = age;
	}

	public String getPhone() {
		return phone;
	}

	public void setPhone(String phone) {
		this.phone = phone;
	}

	public Date getBirthdayDate() {
		return birthdayDate;
	}

	public void setBirthdayDate(Date birthdayDate) {
		this.birthdayDate = birthdayDate;
	}

	public User(String name, Short sex, Short age, String phone, Date birthdayDate) {
		super();
		this.name = name;
		this.sex = sex;
		this.age = age;
		this.phone = phone;
		this.birthdayDate = birthdayDate;
	}

	public User(Long id, String name, Short sex, Short age, String phone, Date birthdayDate) {
		super();
		this.id = id;
		this.name = name;
		this.sex = sex;
		this.age = age;
		this.phone = phone;
		this.birthdayDate = birthdayDate;
	}

	public User(Long id) {
		super();
		this.id = id;
	}

	public User() {
		super();
	}

	@Override
	public String toString() {
		return "User [id=" + id + ", name=" + name + ", sex=" + sex + ", age=" + age + ", phone="
+ phone
				+ ", birthdayDate=" + birthdayDate + "]";
	}

}
```

## User.hbm.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE hibernate-mapping PUBLIC
    "-//Hibernate/Hibernate Mapping DTD 3.0//EN"
    "http://www.hibernate.org/dtd/hibernate-mapping-3.0.dtd">
<hibernate-mapping>
    <class name="online.qsx.model.User" table="tb_user">
        <id name="id" column="user_id" type="java.lang.Long">
            <generator class="identity" />
        </id>
        <property name="name" type="java.lang.String">
            <column name="user_name" unique="true" length="20" />
        </property>
        <property name="sex" type="java.lang.Short">
            <column name="user_sex" />
        </property>
        <property name="age" type="java.lang.Short">
            <column name="user_age" />
        </property>
        <property name="phone" type="java.lang.String">
```

```
            <column name="user_phone" />
        </property>
        <property name="birthdayDate" type="java.util.Date">
            <column name="user_birthdayDate" />
        </property>

        <!-- 一对多 -->
        <set name="orders" cascade="all" lazy="true" >
            <key column="user_id" />
            <one-to-many class="online.qsx.model.Order"/>
        </set>
    </class>
</hibernate-mapping>
```

## Order.java

```java
package online.qsx.model;

import java.util.Date;

import javax.persistence.CascadeType;
import javax.persistence.Entity;
import javax.persistence.FetchType;
import javax.persistence.GeneratedValue;
import javax.persistence.GenerationType;
import javax.persistence.Id;
import javax.persistence.JoinColumn;
import javax.persistence.ManyToOne;
import javax.persistence.Table;
import javax.persistence.Temporal;
import javax.persistence.TemporalType;

public class Order {

    private Long id;

    private String code;

    private Date createDate;

    public Long getId() {
        return id;
    }

    public void setId(Long id) {
        this.id = id;
    }

    public String getCode() {
        return code;
    }

    public void setCode(String code) {
        this.code = code;
    }

    public Date getCreateDate() {
        return createDate;
    }

    public void setCreateDate(Date createDate) {
        this.createDate = createDate;
    }

    public Order(Long id, String code, Date createDate) {
        super();
        this.id = id;
        this.code = code;
        this.createDate = createDate;
    }

    public Order(String code, Date createDate) {
        super();
        this.code = code;
        this.createDate = createDate;
    }

    public Order(Long id) {
        super();
        this.id = id;
    }

    public Order() {
        super();
    }
    @Override
    public String toString() {
        return "Order [id=" + id + ", code=" + code + ", createDate=" +
createDate + "]";
    }

}
```

**Order.hbm.xml**

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE hibernate-mapping PUBLIC
    "-//Hibernate/Hibernate Mapping DTD 3.0//EN"
    "http://www.hibernate.org/dtd/hibernate-mapping-3.0.dtd">
<hibernate-mapping>
    <class name="online.qsx.model.Order" table="tb_order">
        <id name="id" column="order_id" type="java.lang.Long">
            <generator class="identity" />
        </id>
        <property name="code" type="java.lang.String">
            <column name="order_code" />
        </property>
        <property name="createDate" type="java.util.Date">
            <column name="order_createDate" />
        </property>
    </class>
</hibernate-mapping>
```

**hibernate.cfg.xml**

```
<?xml version='1.0' encoding='utf-8'?>
<!DOCTYPE hibernate-configuration PUBLIC
        "-//Hibernate/Hibernate Configuration DTD 3.0//EN"
      "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">
<hibernate-configuration>
    <session-factory>
        <!-- hibernate 第一部分[数据库连接信息] -->
        <property
```

```
name="connection.url">jdbc:mysql://localhost:3306/test?characterEnco
ding=UTF-8</property>
        <property
name="connection.driver_class">com.mysql.jdbc.Driver</property>
        <property name="connection.username">root</property>
        <property name="connection.password">root</property>

        <!-- hibernate 第二部分[hibernate 参数控制] -->
        <property
name="hibernate.dialect">online.qsx.common.MySQL5MyISAMUTF8Dialect</
property><!--
            sql正对的是mysql数据库 -->
        <property name="hibernate.show_sql">true</property><!-- 显示
sql -->
        <property name="hibernate.format_sql">true</property><!-- sql
格式化 -->
        <property name="hbm2ddl.auto">create</property><!-- ddl控制 -->

        <!-- hibernate 第三部分[表的映射信息][XML] -->
        <mapping resource="online/qsx/model/User.hbm.xml" />
        <mapping resource="online/qsx/model/Order.hbm.xml" />
    </session-factory>
</hibernate-configuration>
```

## Test.java

```
package online.qsx.test;

import java.util.Date;

import org.hibernate.Session;
import org.hibernate.SessionFactory;
import org.hibernate.Transaction;
import org.hibernate.boot.registry.StandardServiceRegistry;
import org.hibernate.boot.registry.StandardServiceRegistryBuilder;
import org.hibernate.cfg.Configuration;

import online.qsx.model.Order;
import online.qsx.model.User;

public class Test {
    SessionFactory sf = null;
```

```
Session session = null;
Transaction transaction = null;

/**
 * 开启 hibernate 连接
 */
public void init() {
	// 加载配置文件
	Configuration configuration = new Configuration();
	configuration.configure("hibernate.cfg.xml");
	// 注册标准服务
	StandardServiceRegistryBuilder ssrb = new StandardServiceRegistryBuilder();
	StandardServiceRegistry ssr = ssrb.applySettings(configuration.getProperties()).build();
	// 通过标准服务加载配置文件后获得会话工厂
	sf = configuration.buildSessionFactory(ssr);// 二级缓存
	// 开启一个会话
	session = sf.openSession();// 一级缓存
	// 开启事物
	transaction = session.beginTransaction();
	// 操作
	System.out.println("连接开启成功");
}

/**
 * 关闭 hibernate 连接
 */
public void destroy() {
	// 提交事物
	transaction.commit();
	// 关闭
	session.close();
	sf.close();
	System.out.println("连接关闭成功");
}

public void createTable() {
	init();
	System.out.println("构建表结构");
	destroy();
}

public void save() {
	init();
```

```
		User user=new User("arvin", Short.valueOf("1"), Short.valueOf("1"), "123486789",
new Date());
		user.getOrders().add(new Order("arvin1001", new Date()));
		user.getOrders().add(new Order("arvin1002", new Date()));
		user.getOrders().add(new Order("arvin1003", new Date()));
		user.getOrders().add(new Order("arvin1004", new Date()));
		user.getOrders().add(new Order("arvin1005", new Date()));

		session.save(user);

		destroy();
	}


	public void getUser(){
		init();
		session.get(User.class, 2L);
		destroy();
	}
	public static void main(String[] args) {
		Test test = new Test();
		test.save();
	}
}
```

## 使用 XML 实现单向多对一

### User.java

```
package online.qsx.model;

import java.util.Date;
import java.util.HashSet;
import java.util.Set;

public class User {

	private Long id;

	private String name;

private Short sex;

private Short age;

private String phone;

private Date birthdayDate;

public Long getId() {
        return id;
}

public void setId(Long id) {
        this.id = id;
}

public String getName() {
        return name;
}

public void setName(String name) {
        this.name = name;
}

public Short getSex() {
        return sex;
}

public void setSex(Short sex) {
        this.sex = sex;
}

public Short getAge() {
        return age;
}

public void setAge(Short age) {
        this.age = age;
}

public String getPhone() {
        return phone;
}
```

```
	public void setPhone(String phone) {
		this.phone = phone;
	}

	public Date getBirthdayDate() {
		return birthdayDate;
	}

	public void setBirthdayDate(Date birthdayDate) {
		this.birthdayDate = birthdayDate;
	}

	public User(String name, Short sex, Short age, String phone, Date birthdayDate) {
		super();
		this.name = name;
		this.sex = sex;
		this.age = age;
		this.phone = phone;
		this.birthdayDate = birthdayDate;
	}

	public User(Long id, String name, Short sex, Short age, String phone, Date birthdayDate) {
		super();
		this.id = id;
		this.name = name;
		this.sex = sex;
		this.age = age;
		this.phone = phone;
		this.birthdayDate = birthdayDate;
	}

	public User(Long id) {
		super();
		this.id = id;
	}

	public User() {
		super();
	}

	@Override
	public String toString() {
		return "User [id=" + id + ", name=" + name + ", sex=" + sex + ", age=" + age + ", phone="
+ phone
```

```
                        + ", birthdayDate=" + birthdayDate + "]";
    }

}
```

### User.hbm.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE hibernate-mapping PUBLIC
    "-//Hibernate/Hibernate Mapping DTD 3.0//EN"
    "http://www.hibernate.org/dtd/hibernate-mapping-3.0.dtd">
<hibernate-mapping>
    <class name="online.qsx.model.User" table="tb_user">
        <id name="id" column="user_id" type="java.lang.Long">
            <generator class="identity" />
        </id>
        <property name="name" type="java.lang.String">
            <column name="user_name" unique="true" length="20" />
        </property>
        <property name="sex" type="java.lang.Short">
            <column name="user_sex" />
        </property>
        <property name="age" type="java.lang.Short">
            <column name="user_age" />
        </property>
        <property name="phone" type="java.lang.String">
            <column name="user_phone" />
        </property>
        <property name="birthdayDate" type="java.util.Date">
            <column name="user_birthdayDate" />
        </property>

    </class>
</hibernate-mapping>
```

### Order.java

```
package online.qsx.model;
```

```java
import java.util.Date;

import javax.persistence.CascadeType;
import javax.persistence.Entity;
import javax.persistence.FetchType;
import javax.persistence.GeneratedValue;
import javax.persistence.GenerationType;
import javax.persistence.Id;
import javax.persistence.JoinColumn;
import javax.persistence.ManyToOne;
import javax.persistence.Table;
import javax.persistence.Temporal;
import javax.persistence.TemporalType;

public class Order {

    private Long id;

    private String code;

    private Date createDate;

    //多对一
    private User user;

    public User getUser() {
        return user;
    }

    public void setUser(User user) {
        this.user = user;
    }

    public Long getId() {
        return id;
    }

    public void setId(Long id) {
        this.id = id;
    }

    public String getCode() {
        return code;
    }
    public void setCode(String code) {
        this.code = code;
    }

    public Date getCreateDate() {
        return createDate;
    }

    public void setCreateDate(Date createDate) {
        this.createDate = createDate;
    }

    public Order(Long id, String code, Date createDate) {
        super();
        this.id = id;
        this.code = code;
        this.createDate = createDate;
    }

    public Order(String code, Date createDate) {
        super();
        this.code = code;
        this.createDate = createDate;
    }

    public Order(Long id) {
        super();
        this.id = id;
    }

    public Order() {
        super();
    }

    @Override
    public String toString() {
        return "Order [id=" + id + ", code=" + code + ", createDate=" +
createDate + "]";
    }

}
```

**Order.hbm.xml**

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE hibernate-mapping PUBLIC
    "-//Hibernate/Hibernate Mapping DTD 3.0//EN"
    "http://www.hibernate.org/dtd/hibernate-mapping-3.0.dtd">
<hibernate-mapping>
    <class name="online.qsx.model.Order" table="tb_order">
        <id name="id" column="order_id" type="java.lang.Long">
            <generator class="identity" />
        </id>
        <property name="code" type="java.lang.String">
            <column name="order_code" />
        </property>
        <property name="createDate" type="java.util.Date">
            <column name="order_createDate" />
        </property>

        <!-- 多对一 -->
        <many-to-one cascade="all" lazy="false"  name="user"
class="online.qsx.model.User" column="user_id"/>
    </class>
</hibernate-mapping>
```

**hibernate.cfg.xml**

```
<?xml version='1.0' encoding='utf-8'?>
<!DOCTYPE hibernate-configuration PUBLIC
        "-//Hibernate/Hibernate Configuration DTD 3.0//EN"
      "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">
<hibernate-configuration>
    <session-factory>
        <!-- hibernate 第一部分[数据库连接信息] -->
        <property
name="connection.url">jdbc:mysql://localhost:3306/test?characterEnco
ding=UTF-8</property>
        <property
name="connection.driver_class">com.mysql.jdbc.Driver</property>
        <property name="connection.username">root</property>
        <property name="connection.password">root</property>
        <!-- hibernate 第二部分[hibernate 参数控制] -->
        <property
name="hibernate.dialect">online.qsx.common.MySQL5MyISAMUTF8Dialect</
property><!--
            sql正对的是mysql数据库 -->
        <property name="hibernate.show_sql">true</property><!-- 显示
sql -->
        <property name="hibernate.format_sql">true</property><!-- sql
格式化 -->
        <property name="hbm2ddl.auto">create</property><!-- ddl控制 -->

        <!-- hibernate 第三部分[表的映射信息][XML] -->
        <mapping resource="online/qsx/model/User.hbm.xml" />
        <mapping resource="online/qsx/model/Order.hbm.xml" />
    </session-factory>
</hibernate-configuration>
```

## Test.java

```
package online.qsx.test;

import java.util.Date;

import org.hibernate.Session;
import org.hibernate.SessionFactory;
import org.hibernate.Transaction;
import org.hibernate.boot.registry.StandardServiceRegistry;
import org.hibernate.boot.registry.StandardServiceRegistryBuilder;
import org.hibernate.cfg.Configuration;

import online.qsx.model.Order;
import online.qsx.model.User;

public class Test {
    SessionFactory sf = null;
    Session session = null;
    Transaction transaction = null;

    /**
     * 开启 hibernate 连接
     */
```

```
	public void init() {
		// 加载配置文件
		Configuration configuration = new Configuration();
		configuration.configure("hibernate.cfg.xml");
		// 注册标准服务
		StandardServiceRegistryBuilder ssrb = new StandardServiceRegistryBuilder();
		StandardServiceRegistry ssr = ssrb.applySettings(configuration.getProperties()).build();
		// 通过标准服务加载配置文件后获得会话工厂
		sf = configuration.buildSessionFactory(ssr);// 二级缓存
		// 开启一个会话
		session = sf.openSession();// 一级缓存
		// 开启事物
		transaction = session.beginTransaction();
		// 操作
		System.out.println("连接开启成功");
	}

	/**
	 * 关闭 hibernate 连接
	 */
	public void destroy() {
		// 提交事物
		transaction.commit();
		// 关闭
		session.close();
		sf.close();
		System.out.println("连接关闭成功");
	}

	public void createTable() {
		init();
		System.out.println("构建表结构");
		destroy();
	}

	public void save() {
		init();

		Order order=new Order("jack10001", new Date());
		order.setUser(new User("jack", Short.valueOf("1"), Short.valueOf("1"), "123486789",
new Date()));
		session.save(order);

		destroy();
	}



	public static void main(String[] args) {
		Test test = new Test();
		test.save();
	}
}
```

## 使用 XML 实现双向一对多/多对一

### User.java

```
package online.qsx.model;

import java.util.Date;
import java.util.HashSet;
import java.util.Set;

public class User {

	private Long id;

	private String name;

	private Short sex;

	private Short age;

	private String phone;

	private Date birthdayDate;

	//一对多
	private Set<Order> orders = new HashSet<Order>();

	public Set<Order> getOrders() {
		return orders;
	}

	public void setOrders(Set<Order> orders) {
        this.orders = orders;
    }

    public Long getId() {
        return id;
    }

    public void setId(Long id) {
        this.id = id;
    }

    public String getName() {
        return name;
    }

    public void setName(String name) {
        this.name = name;
    }

    public Short getSex() {
        return sex;
    }

    public void setSex(Short sex) {
        this.sex = sex;
    }

    public Short getAge() {
        return age;
    }

    public void setAge(Short age) {
        this.age = age;
    }

    public String getPhone() {
        return phone;
    }

    public void setPhone(String phone) {
        this.phone = phone;
    }

    public Date getBirthdayDate() {
```

```
		return birthdayDate;
	}

	public void setBirthdayDate(Date birthdayDate) {
		this.birthdayDate = birthdayDate;
	}

	public User(String name, Short sex, Short age, String phone, Date birthdayDate) {
		super();
		this.name = name;
		this.sex = sex;
		this.age = age;
		this.phone = phone;
		this.birthdayDate = birthdayDate;
	}

	public User(Long id, String name, Short sex, Short age, String phone, Date birthdayDate) {
		super();
		this.id = id;
		this.name = name;
		this.sex = sex;
		this.age = age;
		this.phone = phone;
		this.birthdayDate = birthdayDate;
	}

	public User(Long id) {
		super();
		this.id = id;
	}

	public User() {
		super();
	}

	@Override
	public String toString() {
		return "User [id=" + id + ", name=" + name + ", sex=" + sex + ", age=" + age + ", phone="
+ phone
				+ ", birthdayDate=" + birthdayDate + "]";
	}

}
```

**User.hbm.xml**

```xml
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE hibernate-mapping PUBLIC
    "-//Hibernate/Hibernate Mapping DTD 3.0//EN"
    "http://www.hibernate.org/dtd/hibernate-mapping-3.0.dtd">
<hibernate-mapping>
    <class name="online.qsx.model.User" table="tb_user">
        <id name="id" column="user_id" type="java.lang.Long">
            <generator class="identity" />
        </id>
        <property name="name" type="java.lang.String">
            <column name="user_name" unique="true" length="20" />
        </property>
        <property name="sex" type="java.lang.Short">
            <column name="user_sex" />
        </property>
        <property name="age" type="java.lang.Short">
            <column name="user_age" />
        </property>
        <property name="phone" type="java.lang.String">
            <column name="user_phone" />
        </property>
        <property name="birthdayDate" type="java.util.Date">
            <column name="user_birthdayDate" />
        </property>

        <!-- 一对多 -->
        <set name="orders" cascade="all" lazy="true" inverse="true" >
            <key column="user_id" />
            <one-to-many class="online.qsx.model.Order"/>
        </set>
    </class>
</hibernate-mapping>
```

**Order.java**

```java
package online.qsx.model;

import java.util.Date;
```

```java
public class Order {

    private Long id;

    private String code;

    private Date createDate;

    //多对一
    private User user;

    public User getUser() {
        return user;
    }

    public void setUser(User user) {
        this.user = user;
    }

    public Long getId() {
        return id;
    }

    public void setId(Long id) {
        this.id = id;
    }

    public String getCode() {
        return code;
    }

    public void setCode(String code) {
        this.code = code;
    }

    public Date getCreateDate() {
        return createDate;
    }

    public void setCreateDate(Date createDate) {
        this.createDate = createDate;
    }
    public Order(Long id, String code, Date createDate) {
        super();
        this.id = id;
        this.code = code;
        this.createDate = createDate;
    }

    public Order(String code, Date createDate) {
        super();
        this.code = code;
        this.createDate = createDate;
    }

    public Order(Long id) {
        super();
        this.id = id;
    }

    public Order() {
        super();
    }

    @Override
    public String toString() {
        return "Order [id=" + id + ", code=" + code + ", createDate=" +
createDate + "]";
    }

}
```

**Order.hbm.xml**

```xml
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE hibernate-mapping PUBLIC
    "-//Hibernate/Hibernate Mapping DTD 3.0//EN"
    "http://www.hibernate.org/dtd/hibernate-mapping-3.0.dtd">
<hibernate-mapping>
    <class name="online.qsx.model.Order" table="tb_order">
        <id name="id" column="order_id" type="java.lang.Long">
            <generator class="identity" />
        </id>
        <property name="code" type="java.lang.String">
            <column name="order_code" />
        </property>
        <property name="createDate" type="java.util.Date">
            <column name="order_createDate" />
        </property>

        <!-- 多对一 -->
        <many-to-one cascade="all" lazy="false"  name="user"
class="online.qsx.model.User" column="user_id"/>
    </class>
</hibernate-mapping>
```

**hibernate.cfg.xml**

```
<?xml version='1.0' encoding='utf-8'?>
<!DOCTYPE hibernate-configuration PUBLIC
        "-//Hibernate/Hibernate Configuration DTD 3.0//EN"
      "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">
<hibernate-configuration>
    <session-factory>
        <!-- hibernate 第一部分[数据库连接信息] -->
        <property
name="connection.url">jdbc:mysql://localhost:3306/test?characterEnco
ding=UTF-8</property>
        <property
name="connection.driver_class">com.mysql.jdbc.Driver</property>
        <property name="connection.username">root</property>
        <property name="connection.password">root</property>

        <!-- hibernate 第二部分[hibernate 参数控制] -->
        <property
name="hibernate.dialect">online.qsx.common.MySQL5MyISAMUTF8Dialect</
property><!--
            sql正对的是mysql数据库 -->
        <property name="hibernate.show_sql">true</property><!-- 显示
sql -->
        <property name="hibernate.format_sql">true</property><!-- sql
格式化 -->
        <property name="hbm2ddl.auto">create</property><!-- ddl控制 -->
```

```xml
        <!-- hibernate 第三部分[表的映射信息][XML] -->
        <mapping resource="online/qsx/model/User.hbm.xml" />
        <mapping resource="online/qsx/model/Order.hbm.xml" />
    </session-factory>
</hibernate-configuration>
```

## Test.java

```java
package online.qsx.test;

import java.util.Date;

import org.hibernate.Session;
import org.hibernate.SessionFactory;
import org.hibernate.Transaction;
import org.hibernate.boot.registry.StandardServiceRegistry;
import org.hibernate.boot.registry.StandardServiceRegistryBuilder;
import org.hibernate.cfg.Configuration;

import online.qsx.model.Order;
import online.qsx.model.User;

public class Test {
    SessionFactory sf = null;
    Session session = null;
    Transaction transaction = null;

    /**
     * 开启 hibernate 连接
     */
    public void init() {
        // 加载配置文件
        Configuration configuration = new Configuration();
        configuration.configure("hibernate.cfg.xml");
        // 注册标准服务
        StandardServiceRegistryBuilder ssrb = new StandardServiceRegistryBuilder();
        StandardServiceRegistry ssr = ssrb.applySettings(configuration.getProperties()).build();
        // 通过标准服务加载配置文件后获得会话工厂
        sf = configuration.buildSessionFactory(ssr);// 二级缓存
        // 开启一个会话
        session = sf.openSession();// 一级缓存
```

```
		// 开启事物
		transaction = session.beginTransaction();
		// 操作
		System.out.println("连接开启成功");
	}

	/**
	 *  关闭 hibernate 连接
	 */
	public void destroy() {
		// 提交事物
		transaction.commit();
		// 关闭
		session.close();
		sf.close();
		System.out.println("连接关闭成功");
	}

	public void createTable() {
		init();
		System.out.println("构建表结构");
		destroy();
	}

	public void save() {
		init();

		Order order=new Order("jack10001", new Date());
		order.setUser(new  User("jack", Short.valueOf("1"), Short.valueOf("1"), "123486789",
new Date()));
		session.save(order);


//		User user=new  User("arvin", Short.valueOf("1"), Short.valueOf("1"), "123486789",
new Date());
//		user.getOrders().add(new Order("arvin1001", new Date()));
//		user.getOrders().add(new Order("arvin1002", new Date()));
//		user.getOrders().add(new Order("arvin1003", new Date()));
//		user.getOrders().add(new Order("arvin1004", new Date()));
//		user.getOrders().add(new Order("arvin1005", new Date()));
//
//		session.save(user);

		destroy();
	}


	public void getUser(){
		init();
		session.get(User.class, 2L);
		destroy();
	}
	public static void main(String[] args) {
		Test test = new Test();
		test.save();
	}
}
```

## 使用 XML 实现双向多对多

### Order.java

```
package online.qsx.model;

import java.util.Date;
import java.util.HashSet;
import java.util.Set;

/**
 * 订单
 */
public class Order {

	// 普通属性
	private Long id;

	private String code;

	private Date createTime;

	// 特殊属性
	// 一个订单 对应 多个商品
	private Set<Commdity> commdities = new HashSet<Commdity>();

	public Long getId() {
        return id;
    }

    public void setId(Long id) {
        this.id = id;
    }

    public String getCode() {
        return code;
    }

    public void setCode(String code) {
        this.code = code;
    }

    public Date getCreateTime() {
        return createTime;
    }

    public void setCreateTime(Date createTime) {
        this.createTime = createTime;
    }

    public Set<Commdity> getCommdities() {
        return commdities;
    }

    public void setCommdities(Set<Commdity> commdities) {
        this.commdities = commdities;
    }

    public Order(Long id, String code, Date createTime) {
        super();
        this.id = id;
        this.code = code;
        this.createTime = createTime;
    }

    public Order(String code, Date createTime) {
        super();
        this.code = code;
        this.createTime = createTime;
    }
```

```
	public Order(Long id) {
		super();
		this.id = id;
	}

	public Order() {
		super();
	}

	@Override
	public String toString() {
		return "Order [id=" + id + ", code=" + code + ", createTime=" + createTime + "]";
	}

	public String toStringAndCommditys() {
		return "Order [id=" + id + ", code=" + code + ", createTime=" + createTime +
",commdity="+commdities+"]";
	}
}
```

### Order.hbm.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE hibernate-mapping PUBLIC
    "-//Hibernate/Hibernate Mapping DTD 3.0//EN"
    "http://www.hibernate.org/dtd/hibernate-mapping-3.0.dtd">
<hibernate-mapping>
    <class name="online.qsx.model.Order" table="tb_order">
        <id name="id" column="order_id" type="java.lang.Long">
            <generator class="identity" />
        </id>
        <property name="code" column="order_code"
type="java.lang.String"/>
        <property name="createTime" column="order_createTime"
type="java.util.Date"/>

        <!-- 多对多 -->
        <set name="commdities" table="tb_commdity_order"
inverse="false" cascade="save-update" lazy="true">
            <key column="order_id"/>
            <many-to-many class="online.qsx.model.Commdity"
column="commdity_id"/>
```

```
        </set>
    </class>
</hibernate-mapping>
```

## Commdity.java

```
package online.qsx.model;

import java.util.HashSet;
import java.util.Set;

/**
 *  商品
 */
public class Commdity {
    //  普通属性
    private Long id;
    private String name;
    private Double money;

    //  特殊属性
    //一个商品对应多个订单
    private Set<Order> orders = new HashSet<Order>();

    public Long getId() {
        return id;
    }

    public void setId(Long id) {
        this.id = id;
    }

    public String getName() {
        return name;
    }

    public void setName(String name) {
        this.name = name;
    }

    public Double getMoney() {
```

```
		return money;
	}

	public void setMoney(Double money) {
		this.money = money;
	}

	public Set<Order> getOrders() {
		return orders;
	}

	public void setOrders(Set<Order> orders) {
		this.orders = orders;
	}

	public Commdity(Long id, String name, Double money) {
		super();
		this.id = id;
		this.name = name;
		this.money = money;
	}

	public Commdity(String name, Double money) {
		super();
		this.name = name;
		this.money = money;
	}

	public Commdity(Long id) {
		super();
		this.id = id;
	}

	public Commdity() {
		super();
	}

	@Override
	public String toString() {
		return "Commdity [id=" + id + ", name=" + name + ", money=" + money + "]";
	}

	public String toStringAndOrders() {
		return "Commdity [id=" + id + ", name=" + name + ", money=" + money + ", orders=" +
orders + "]";
    }

}
```

## Commdity.hbm.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE hibernate-mapping PUBLIC
    "-//Hibernate/Hibernate Mapping DTD 3.0//EN"
    "http://www.hibernate.org/dtd/hibernate-mapping-3.0.dtd">
<hibernate-mapping>
    <class name="online.qsx.model.Commdity" table="tb_commdity">
        <id name="id" column="commdity_id" type="java.lang.Long">
            <generator class="identity" />
        </id>
        <property name="name" column="commdity_name"
type="java.lang.String"/>
        <property name="money" column="commdity_money"
type="java.lang.Double"/>

        <!-- 多对多 -->
        <set name="orders" table="tb_commdity_order">
            <key column="commdity_id"/>
            <many-to-many class="online.qsx.model.Order"
column="order_id"/>
        </set>
    </class>
</hibernate-mapping>
```

## hibernate.cfg.xml

```
<?xml version='1.0' encoding='utf-8'?>
<!DOCTYPE hibernate-configuration PUBLIC
        "-//Hibernate/Hibernate Configuration DTD 3.0//EN"
      "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">
<hibernate-configuration>
    <session-factory>
        <!-- hibernate 第一部分[数据库连接信息] -->
        <property
name="connection.url">jdbc:mysql://localhost:3306/test?characterEnco
ding=UTF-8</property>
        <property
name="connection.driver_class">com.mysql.jdbc.Driver</property>
        <property name="connection.username">root</property>
        <property name="connection.password">root</property>

        <!-- hibernate 第二部分[hibernate 参数控制] -->
        <property
name="hibernate.dialect">online.qsx.common.MySQL5MyISAMUTF8Dialect</
property><!--
            sql正对的是mysql数据库 -->
        <property name="hibernate.show_sql">true</property><!-- 显示
sql -->
        <property name="hibernate.format_sql">true</property><!-- sql
格式化 -->
        <property name="hbm2ddl.auto">update</property><!-- ddl控制 -->

        <!-- hibernate 第三部分[表的映射信息][XML] -->
        <mapping resource="online/qsx/model/Commdity.hbm.xml"/>
        <mapping resource="online/qsx/model/Order.hbm.xml"/>
    </session-factory>
</hibernate-configuration>
```

**Test.java**

```
package online.qsx.test;

import java.util.Date;

import org.hibernate.Query;
import org.hibernate.Session;
import org.hibernate.SessionFactory;
import org.hibernate.Transaction;
import org.hibernate.boot.registry.StandardServiceRegistry;
import org.hibernate.boot.registry.StandardServiceRegistryBuilder;
import org.hibernate.cfg.Configuration;

import online.qsx.model.Commdity;
import online.qsx.model.Order;
```

```
public class Test {
    SessionFactory sf = null;
    Session session = null;
    Transaction transaction = null;

    /**
     * 开启hibernate连接
     */
    public void init() {
        // 加载配置文件
        Configuration configuration = new Configuration();
        configuration.configure("hibernate.cfg.xml");
        // 注册标准服务
        StandardServiceRegistryBuilder ssrb = new
StandardServiceRegistryBuilder();
        StandardServiceRegistry ssr =
ssrb.applySettings(configuration.getProperties()).build();
        // 通过标准服务加载配置文件后获得会话工厂
        sf = configuration.buildSessionFactory(ssr);// 二级缓存
        // 开启一个会话
        session = sf.openSession();// 一级缓存
        // 开启事物
        transaction = session.beginTransaction();
        // 操作
        System.out.println("连接开启成功");
    }

    /**
     * 关闭hibernate连接
     */
    public void destroy() {
        // 提交事物
        transaction.commit();
        // 关闭
        session.close();
        sf.close();
        System.out.println("连接关闭成功");
    }

    public void createTable() {
        init();
        System.out.println("构建表结构");
        destroy();
```

```java
    }

    public void save(){
        init();
        Order order=new Order("jack1001",new Date());
        order.getCommdities().add(new Commdity("aaaa",5000.0));
        order.getCommdities().add(new Commdity("aa2a",5000.0));
        order.getCommdities().add(new Commdity("aa4a",5000.0));

        session.save(order);
        destroy();
    }

    public void find(){
        init();
        Query query=session.createQuery("from Order where id=1");
        Order order=(Order)query.uniqueResult();

        System.out.println(order.toStringAndCommditys());

        destroy();


    }

    public static void main(String[] args) {
        Test test = new Test();
        test.find();
    }
}
```

## 使用 XML 实现一对一[平台学学习]

## 级联关系:cascade

```xml
<!-- 一对多 -->
<set name="orders" cascade="all" >
    <key column="user_id" />
    <one-to-many class="online.qsx.model.Order"/>
</set>
```

```
<!-- 多对一 -->
<many-to-one
    cascade="all"
    name="user"
    class="online.qsx.model.User"
    column="user_id"
/>
```

## 懒加载,立即加载:lazy

```
<!-- 一对多 -->
<set name="orders"  lazy="true" >
           <key column="user_id" />
  <one-to-many class="online.qsx.model.Order"/>
</set>

<!-- 多对一 -->
<many-to-one
    lazy="false"
    name="user"
    class="online.qsx.model.User"
    column="user_id"
/>
```

## 控制反转: inverse

```
<!-- 一对多 -->
<set name="orders" inverse="true" >
    <key column="user_id" />
    <one-to-many class="online.qsx.model.Order"/>
</set>

<!-- 多对一 -->
<many-to-one
    cascade="all"
    name="user"
    class="online.qsx.model.User"
    column="user_id"
/>
```

## 课程作业

平台推送

利用 Hibernate 实现一对多关联映射,使用 XML 配置

利用 Hibernate 实现多对一关联映射,使用 XML 配置

利用 Hibernate 实现多对多关联映射,使用 XML 配置

利用 Hibernate 实现一对一关联映射,使用 XML 配置

# Hibernate 实现系统权限管理模块

## 课程目标

权限表结构, ER 图

核心结构字段

资源字段

角色字段

用户字段

表结构截图

资源表

角色表

用户表

资源 and 角色关系表

角色 and 用户关系表

## 课程作业

## 非平台推送

### 使用 Hibernate 实现系统权限管理模块,(java 控制台项目)

**完成功能:**

**1. 游客**

1.1 注册账户

1.2 登陆系统

**2.普通用户**

2.1**[all]**输入账号密码登陆系统

2.2**[all]**登陆系统后能修改自己信息功能(改账号,改密码,改备注)

2.3**[all]**登陆系统后**能够浏览**自己的**角色信息列表**

2.4**[all]**登陆系统后能够输入**自己拥有的角色名称**浏览到对应的资源信息列表

**3.系统管理员**

3.1**[all]**输入账号密码登陆系统

3.2**[all]**登陆系统后能修改自己信息功能(改账号,改密码,改备注)

3.3**[all]**登陆系统后**能够浏览**自己的**角色信息列表**

3.4**[all]**登陆系统后能够输入**自己拥有的角色名称**浏览到对应的资源信息列表

3.5**[system]**浏览所有用户对应的角色及对应的资源信息

3.6**[system]**修改

3.6.1 资源信息功能(改名称,改状态,改备注)

3.6.2 角色信息功能(改名称,改状态,改备注)

3.6.3 用户信息功能(改状态)

### 3.7[system]浏览

3.7.1 用户列表

3.7.2 角色列表

3.7.3 资源列表

### 3.8[system]删除

3.8.1 用户信息

3.8.2 角色信息

3.8.3 资源信息

**要求：**

**1.使用 Hibernate JPA,XMl,各实现一套**

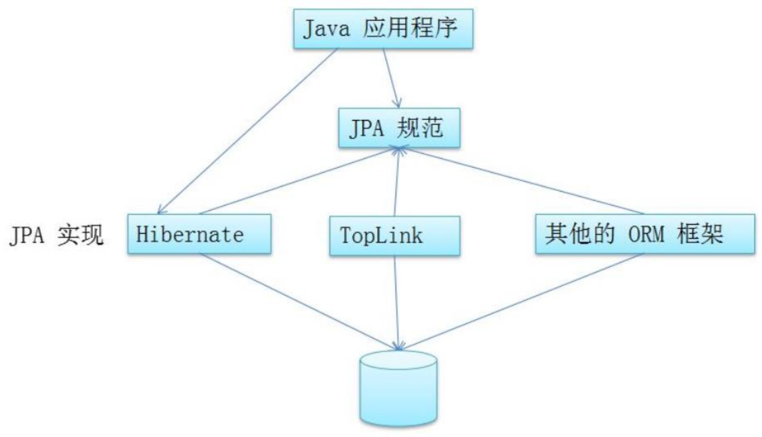
# 初始 JPA 规范

## JPA 简介

JPA 是 Java Persistence API 的简称，中文名 Java 持久层 API，是 JDK 5.0 注解或 XML 描述对象－关系表的映射关系，并将运行期的实体对象持久化到数据库中。

Sun 引入新的 JPA ORM 规范出于两个原因：其一，简化现有 Java EE 和 Java SE 应用开发工作；其二，Sun 希望整合 ORM 技术，实现天下归一。

## JPA 流程示例图



## JPA 起源

JPA 由 EJB 3.0 软件专家组开发，作为 JSR-220 实现的一部分。但它又不限于 EJB 3.0，你可以在 Web 应用、甚至桌面应用中使用。JPA 的宗旨是为 POJO 提供持久化标准规范，由此可见，经过这几年的实践探索，能够脱离容器独立运行，方便开发和测试的理念已经深入人心了。Hibernate3.2+、TopLink 10.1.3 以及 OpenJPA 都提供了 JPA 的实现。

JPA 的总体思想和现有 Hibernate、TopLink、JDO 等 ORM 框架大体一致。

## JPA 包括以下 3 方面的技术：

### ORM 映射元数据

JPA 支持 XML 和 JDK5.0 注解两种元数据的形式，元数据描述对象和表之间的映射关系，框架据此将实体对象持久化到数据库表中；

### API

用来操作实体对象，执行 CRUD 操作，框架在后台替代我们完成所有的事情，开发者从繁琐的 JDBC 和 SQL 代码中解脱出来。

### 查询语言

这是持久化操作中很重要的一个方面，通过面向对象而非面向数据库的查询语言查询

数据，避免程序的 SQL 语句紧密耦合。

## JPA 优势

### 标准化

JPA 是 JCP 组织发布的 Java EE 标准之一，因此任何声称符合 JPA 标准的框架都遵循同样的架构，提供相同的访问 API，这保证了基于 JPA 开发的企业应用能够经过少量的修改就能够在不同的 JPA 框架下运行。

容器级特性的支持

JPA 框架中支持大数据集、事务、并发等容器级事务，这使得 JPA 超越了简单持久化框架的局限，在企业应用发挥更大的作用。

### 简单方便

JPA 的主要目标之一就是提供更加简单的编程模型：在 JPA 框架下创建实体和创建 Java 类一样简单，没有任何的约束和限制，只需要使用 javax.persistence.Entity 进行注释，JPA 的框架和接口也都非常简单，没有太多特别的规则和设计模式的要求，开发者可以很容易的掌握。JPA 基于非侵入式原则设计，因此可以很容易的和其它框架或者容器集成。

### 查询能力

JPA 的查询语言是面向对象而非面向数据库的，它以面向对象的自然语法构造查询语句，可以看成是 Hibernate HQL 的等价物。JPA 定义了独特的 JPQL（Java Persistence Query Language），JPQL 是 EJB QL 的一种扩展，它是针对实体的一种查询语言，操作对象是实体，而不是关系数据库的表，而且能够支持批量更新和修改、JOIN、GROUP BY、HAVING 等通常只有 SQL 才能够提供的高级查询特性，甚至还能够支持子查询。

### 高级特性

JPA 中能够支持面向对象的高级特性，如类之间的继承、多态和类之间的复杂关系，这样的支持能够让开发者最大限度的使用面向对象的模型设计企业应用，而不需要自行处理这些特性在关系数据库的持久化。

## 供应商

JPA 的目标之一是制定一个可以由很多供应商实现的 API，并且开发人员可以编码来实现该 API，而不是使用私有供应商特有的 API。因此开发人员只需使用供应商特有的 API 来获得 JPA 规范没有解决但应用程序中需要的功能。尽可能地使用 JPA API，但是当需要供应商公开但是规范中没有提供的功能时，则使用供应商特有的 API。

### Hibernate

JPA 是需要 Provider 来实现其功能的，Hibernate 就是 JPA Provider 中很强的一个，应该说无人能出其右。从功能上来说，JPA 就是 Hibernate 功能的一个子集。Hibernate 从 3.2 开始，就开始兼容 JPA。Hibernate3.2 获得了 Sun TCK 的 JPA(Java Persistence API) 兼容认证。

只要熟悉 Hibernate 或者其他 ORM 框架，在使用 JPA 时会发现其实非常容易上手。例如实体对象的状态，在 Hibernate 有自由、持久、游离三种，JPA 里有 new，managed，detached，removed，明眼人一看就知道，这些状态都是一一对应的。再如 flush 方法，都是对应的，而其他的再如说 Query query = manager.createQuery(sql)，它在 Hibernate 里写法上是 session，而在 JPA 中变成了 manager，所以从 Hibernate 到 JPA 的代价应该是非常小的

同样，JDO，也开始兼容 JPA。在 ORM 的领域中，看来 JPA 已经是王道，规范就是规范。在各大厂商的支持下，JPA 的使用开始变得广泛。

### Spring

Spring + Hibernate 常常被称为 Java Web 应用人气最旺的框架组合。而在 JCP 通过的 Web Beans JSR ，却欲将 JSF + EJB + JPA 、来自 JBoss Seam（Spring 除外）的一些组件和 EJB 3（能够提供有基本拦截和依赖注入功能的简化 Session Bean 框架）的一个 Web 组合进行标准化。Spring 2.0 为 JPA 提供了完整的 EJB 容器契约，允许 JPA 在任何环境内可以在 Spring 管理的服务层使用（包括 Spring 的所有 DI 和 AOP 增强）。同时，关于下一个 Web 应用组合会是 EJB、Spring + Hibernate 还是 Spring + JPA 的论战，早已充斥于耳。

在 Spring 2.0.1 中，正式提供对 JPA 的支持，这也促成了 JPA 的发展，要知道 JPA 的好处在于可以分离于容器运行，变得更加的简洁。

### OpenJPA

OpenJPA 是 Apache 组织提供的开源项目，它实现了 EJB 3.0 中的 JPA 标准，为开发者提供功能强大、使用简单的持久化数据管理框架。OpenJPA 封装了和关系型数据库交互的操作，让开发者把注意力集中在编写业务逻辑上。OpenJPA 可以作为独立的持久层框架发挥作用，也可以轻松的与其它 Java EE 应用框架或者符合 EJB 3.0 标准的容器集成。

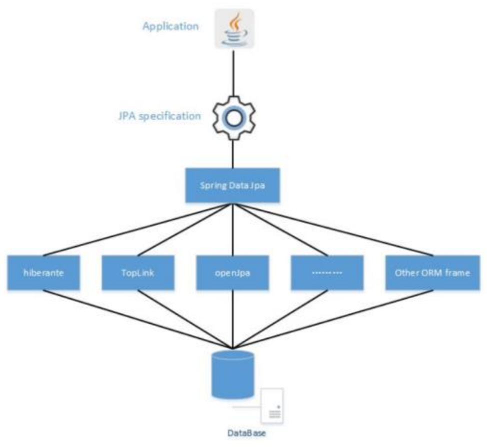
支持的实现包括 Toplink、Hibernate Entitymanager 等。TopLink 以前需要收费，如今开源了。OpenJPA 虽然免费，但功能、性能、普及性等方面更加需要加大力度。

对于 EJB 来说，实体 Bean 一直是被批评的对象，由于其太复杂和庞大。JPA 的出现，很大程度的分离了复杂性。这让 EJB 的推广也变得容易。

总而言之，JPA 规范主要关注的仅是 API 的行为方面，而由各种实现完成大多数性能有关的调优。尽管如此，所有可靠的实现都应该拥有某种数据缓存，以作为选择。但愿不久的将来，JPA 能成为真正的标准。

## 初始 Spring Data JPA + Hibernate 实现

### Spring Data JPA 定位



### Spring Data JPA 整合 Hibernate 依赖

### 配置文件

### pom.xml

```
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
	xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
	<modelVersion>4.0.0</modelVersion>
	<groupId>online.qsx</groupId>
	<artifactId>JPA_Repository</artifactId>
	<version>0.0.1-SNAPSHOT</version>
	<properties>
		<!-- spring版本号 -->
		<spring.version>4.3.8.RELEASE</spring.version>
		<!-- spring data jpa 版本号 -->
		<spring-data-jpa.version>1.10.1.RELEASE</spring-data-jpa.version>
		<!-- hibernate 版本号 -->
		<hibernate.version>5.1.0.Final</hibernate.version>
		<!-- mysql 版本号 -->
		<mysql.version>5.1.38</mysql.version>
	</properties>
	<dependencies>
		<!-- spring ioc -->
		<dependency>
			<groupId>org.springframework</groupId>
			<artifactId>spring-core</artifactId>
			<version>${spring.version}</version>
		</dependency>
		<!-- spring mvc -->
		<dependency>
			<groupId>org.springframework</groupId>
			<artifactId>spring-webmvc</artifactId>
			<version>${spring.version}</version>
		</dependency>
		<!-- spring orm -->
		<dependency>
			<groupId>org.springframework</groupId>
			<artifactId>spring-tx</artifactId>
			<version>${spring.version}</version>
		</dependency>
		<dependency>
			<groupId>org.springframework</groupId>
			<artifactId>spring-jdbc</artifactId>
			<version>${spring.version}</version>
		</dependency>
		<dependency>
			<groupId>org.springframework</groupId>
			<artifactId>spring-orm</artifactId>
			<version>${spring.version}</version>
		</dependency>
		<!-- spring data jpa -->
		<dependency>
			<groupId>org.springframework.data</groupId>
			<artifactId>spring-data-jpa</artifactId>
			<version>${spring-data-jpa.version}</version>
		</dependency>
		<!-- hibernate -->
		<dependency>
```

```
                <groupId>org.hibernate</groupId>

                <artifactId>hibernate-core</artifactId>

                <version>${hibernate.version}</version>

            </dependency>

            <!-- hibernate jpa -->

            <dependency>

                <groupId>org.hibernate</groupId>

                <artifactId>hibernate-entitymanager</artifactId>

                <version>${hibernate.version}</version>

            </dependency>

            <!-- mysql -->

            <dependency>

                <groupId>mysql</groupId>

                <artifactId>mysql-connector-java</artifactId>

                <version>${mysql.version}</version>

            </dependency>

        </dependencies>

</project>
```

## applicationContext-jdbc.xml

```
<?xml version="1.0" encoding="UTF-8"?>

<beans xmlns="http://www.springframework.org/schema/beans"

      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"

      xmlns:jdbc="http://www.springframework.org/schema/jdbc"

      xsi:schemaLocation="

      http://www.springframework.org/schema/beans

       http://www.springframework.org/schema/beans/spring-beans.xsd

       http://www.springframework.org/schema/jdbc

       http://www.springframework.org/schema/jdbc/spring-jdbc.xsd  ">

      <jdbc:initialize-database data-source="dataSource">

            <jdbc:script location="classpath:news.sql" />

      </jdbc:initialize-database>

</beans>
```

## applicationContext-jpa.xml

```
<?xml version="1.0" encoding="UTF-8"?>

<beans xmlns="http://www.springframework.org/schema/beans"

      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
```

```xml
xmlns:context="http://www.springframework.org/schema/context"
      xmlns:tx="http://www.springframework.org/schema/tx" xmlns:jpa="http://www.springframework.org/schema/data/jpa"
      xsi:schemaLocation="http://www.springframework.org/schema/beans
http://www.springframework.org/schema/beans/spring-beans.xsd
            http://www.springframework.org/schema/data/jpa
http://www.springframework.org/schema/data/jpa/spring-jpa-1.3.xsd
            http://www.springframework.org/schema/tx http://www.springframework.org/schema/tx/spring-tx-4.0.xsd
            http://www.springframework.org/schema/context
http://www.springframework.org/schema/context/spring-context-4.0.xsd  ">
      <!--1 配置数据源 -->
      <bean id="dataSource" class="org.springframework.jdbc.datasource.DriverManagerDataSource">
            <property name="driverClassName" value="com.mysql.jdbc.Driver" />
            <property name="username" value="root" />
            <property name="password" value="root" />
            <property name="url" value="jdbc:mysql:///test?characterEncoding=UTF-8" />
      </bean>
      <!--2 配置EntityManagerFactory -->
      <bean id="entityManagerFactory" class="org.springframework.orm.jpa.LocalContainerEntityManagerFactoryBean">
            <!-- 数据源 -->
            <property name="dataSource" ref="dataSource" />
            <!-- JPA只是一个规范,使用其中的是一个实现 HibernateJpaVendorAdapter -->
            <property name="jpaVendorAdapter">
                  <bean class="org.springframework.orm.jpa.vendor.HibernateJpaVendorAdapter" />
            </property>
            <!-- 扫描JPA存在的实体 -->
            <property name="packagesToScan" value="online.qsx.model" />
            <!-- Hibernate 参数的配置 -->
            <property name="jpaProperties">
                  <props>
                        <prop key="hibernate.ejb.naming_strategy">org.hibernate.cfg.ImprovedNamingStrategy</prop>
                        <prop key="hibernate.dialect">online.qsx.common.MySQL5InnoDBUTF8Dialect</prop>
                        <prop key="hibernate.show_sql">true</prop>
                        <prop key="hibernate.format_sql">true</prop>
                        <prop key="hibernate.hbm2ddl.auto">update</prop>
                  </props>
            </property>
      </bean>
      <!--3 配置事务管理器 -->
      <bean id="transactionManager" class="org.springframework.orm.jpa.JpaTransactionManager">
            <property name="entityManagerFactory" ref="entityManagerFactory" />
      </bean>
      <!--4 配置支持注解的事务 -->
      <tx:annotation-driven transaction-manager="transactionManager" />
      <!--5 扫描包,识别数据库访问 配置spring data -->
```

```
    <jpa:repositories base-package="online.qsx.repository" entity-manager-factory-ref="entityManagerFactory" />
</beans>
```

## news.sql

```
/*
SQLyog Ultimate v12.08 (64 bit)
MySQL - 5.6.26 : Database - test
*********************************************************************
*/
/*!40101 SET NAMES utf8 */;
/*!40101 SET SQL_MODE=''*/;
/*!40014 SET @OLD_UNIQUE_CHECKS=@@UNIQUE_CHECKS, UNIQUE_CHECKS=0 */;
/*!40014 SET @OLD_FOREIGN_KEY_CHECKS=@@FOREIGN_KEY_CHECKS, FOREIGN_KEY_CHECKS=0 */;
/*!40101 SET @OLD_SQL_MODE=@@SQL_MODE, SQL_MODE='NO_AUTO_VALUE_ON_ZERO' */;
/*!40111 SET @OLD_SQL_NOTES=@@SQL_NOTES, SQL_NOTES=0 */;
USE `test`;
/*Table structure for table `tb_news` */
DROP TABLE IF EXISTS `tb_news`;
CREATE TABLE `tb_news` (
  `id` bigint(20) NOT NULL AUTO_INCREMENT,
  `author` varchar(255) DEFAULT NULL,
  `content` varchar(255) DEFAULT NULL,
  `introduction` varchar(255) DEFAULT NULL,
  `modifyDate` date DEFAULT NULL,
  `title` varchar(255) DEFAULT NULL,
  `createDate` date DEFAULT NULL,
  PRIMARY KEY (`id`)
) ENGINE=InnoDB AUTO_INCREMENT=8 DEFAULT CHARSET=utf8;
/*Data for the table `tb_news` */
LOCK TABLES `tb_news` WRITE;
insert  into `tb_news`(`id`,`author`,`content`,`introduction`,`modifyDate`,`title`,`createDate`) values
(1,'jack','xxxxx','xxxxx','2017-10-15','贵州遵义下期千年一遇的鹅毛大雪
','2017-10-23'),(2,'jack','xxxxx','xxxxx','2017-10-15','遵义高铁
','2017-10-13'),(3,'jack','xxxxx','xxxxx','2017-11-03','遵义火车站
','2017-10-11'),(4,'jack','xxxxx','xxxxx','2017-10-15','遵义大数据千人培训中心
','2017-10-01'),(5,'jack','xxxxx','xxxxx','2017-10-15','贵州互联网基地
','2017-10-12'),(6,'enal','xxxx','xxxx','2017-10-15','遵义下鹅毛大雪了','2017-10-15');
UNLOCK TABLES;
/*!40101 SET SQL_MODE=@OLD_SQL_MODE */;
/*!40014 SET FOREIGN_KEY_CHECKS=@OLD_FOREIGN_KEY_CHECKS */;
/*!40014 SET UNIQUE_CHECKS=@OLD_UNIQUE_CHECKS */;
```

```
/*!40111 SET SQL_NOTES=@OLD_SQL_NOTES */;
```

## 源码

### MySQL5InnoDBUTF8Dialect.java

```java
package online.qsx.common;

import org.hibernate.dialect.MySQL5Dialect;

/**

 * 引擎 InnoDB

 * 字符集 UTF-8

 */

public class MySQL5InnoDBUTF8Dialect extends MySQL5Dialect {

	@Override

	public String getTableTypeString() {

		return " ENGINE=InnoDB DEFAULT CHARSET=UTF8";

	}

}
```

### NewsModel.java

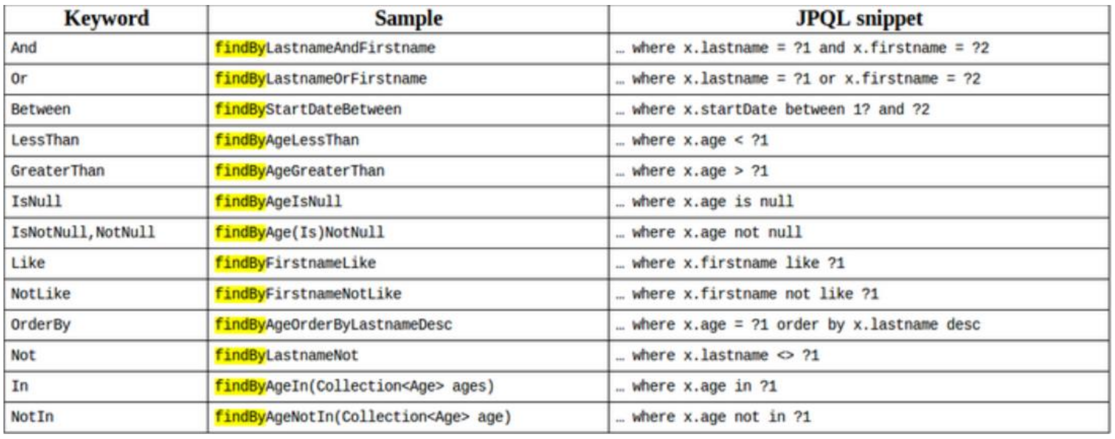
```java
package online.qsx.model;

import java.util.Date;

import javax.persistence.Entity;

import javax.persistence.GeneratedValue;

import javax.persistence.GenerationType;

import javax.persistence.Id;

import javax.persistence.Table;

import javax.persistence.Temporal;

import javax.persistence.TemporalType;


@Entity

@Table(name = "tb_news")

public class NewsModel {


	@Id

	@GeneratedValue(strategy = GenerationType.IDENTITY)

	private Long id;
	private String title;
	private String author;
	private String introduction;
	private String content;
	@Temporal(TemporalType.DATE)
	private Date createDate;
	@Temporal(TemporalType.DATE)
	private Date modifyDate;

	public Long getId() {
		return id;
	}
	public void setId(Long id) {
		this.id = id;
	}
	public String getTitle() {
		return title;
	}
	public void setTitle(String title) {
		this.title = title;
	}
	public String getAuthor() {
		return author;
	}
	public void setAuthor(String author) {
		this.author = author;
	}
	public String getIntroduction() {
		return introduction;
	}
	public void setIntroduction(String introduction) {
		this.introduction = introduction;
	}
	public String getContent() {
		return content;
	}
	public void setContent(String content) {
		this.content = content;
	}
	public Date getCreateDate() {
		return createDate;
	}
	public void setCreateDate(Date createDate) {
		this.createDate = createDate;
```

```java
	}
	public Date getModifyDate() {
		return modifyDate;
	}
	public void setModifyDate(Date modifyDate) {
		this.modifyDate = modifyDate;
	}

	@Override
	public String toString() {
		return "NewsModel [id=" + id + ", title=" + title + ", author=" + author + ", introduction=" + introduction
				+ ", content=" + content + ", createDate=" + createDate + ", modifyDate=" + modifyDate + "]";
	}

	public NewsModel(Long id, String title, String author, String introduction, String content, Date createDate,
			Date modifyDate) {
		super();
		this.id = id;
		this.title = title;
		this.author = author;
		this.introduction = introduction;
		this.content = content;
		this.createDate = createDate;
		this.modifyDate = modifyDate;
	}

	public NewsModel(String title, String author, String introduction, String content, Date createDate,
			Date modifyDate) {
		super();
		this.title = title;
		this.author = author;
		this.introduction = introduction;
		this.content = content;
		this.createDate = createDate;
		this.modifyDate = modifyDate;
	}

	public NewsModel(Long id) {
		super();
		this.id = id;
	}

	public NewsModel() {
		super();
```

```
        }

}
```

## Repository 组件优化数据访问

### Spring Data JPA Repository 接口 SQL 语句编写规则



| Keyword | Sample | JPQL snippet |
|---|---|---|
| And | findByLastnameAndFirstname | … where x.lastname = ?1 and x.firstname = ?2 |
| Or | findByLastnameOrFirstname | … where x.lastname = ?1 or x.firstname = ?2 |
| Between | findByStartDateBetween | … where x.startDate between 1? and ?2 |
| LessThan | findByAgeLessThan | … where x.age < ?1 |
| GreaterThan | findByAgeGreaterThan | … where x.age > ?1 |
| IsNull | findByAgeIsNull | … where x.age is null |
| IsNotNull,NotNull | findByAge(Is)NotNull | … where x.age not null |
| Like | findByFirstnameLike | … where x.firstname like ?1 |
| NotLike | findByFirstnameNotLike | … where x.firstname not like ?1 |
| OrderBy | findByAgeOrderByLastnameDesc | … where x.age = ?1 order by x.lastname desc |
| Not | findByLastnameNot | … where x.lastname <> ?1 |
| In | findByAgeIn(Collection<Age> ages) | … where x.age in ?1 |
| NotIn | findByAgeNotIn(Collection<Age> age) | … where x.age not in ?1 |

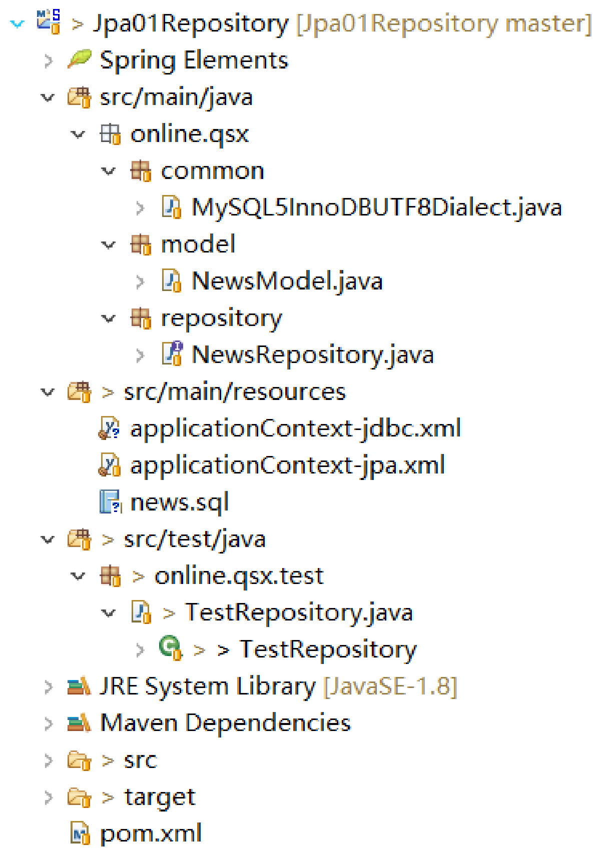
## 源码分析

### Repository.java

```
package org.springframework.data.repository;
import java.io.Serializable;
public interface Repository<T, ID extends Serializable> {
}
```

## 示例

### 项目架构图


```
Jpa01Repository [Jpa01Repository master]
  Spring Elements
  src/main/java
    online.qsx
      common
        MySQL5InnoDBUTF8Dialect.java
      model
        NewsModel.java
      repository
        NewsRepository.java
  src/main/resources
    applicationContext-jdbc.xml
    applicationContext-jpa.xml
    news.sql
  src/test/java
    online.qsx.test
      TestRepository.java
        TestRepository
  JRE System Library [JavaSE-1.8]
  Maven Dependencies
  src
  target
  pom.xml
```

### 配置文件

#### pom.xml

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

#### applicationContext-jdbc.xml

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

## applicationContext-jpa.xml

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

## news.sql

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

## 源码文件

## MySQL5InnoDBUTF8Dialect.java

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

## NewsModel.java

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

## NewsRepository.java

```
package online.qsx.repository;
import java.util.Date;
import java.util.List;
import org.springframework.data.repository.Repository;
import online.qsx.model.NewsModel;
public interface NewsRepository extends Repository<NewsModel, Long> {
	/**
	 * 查询新闻标题中包含“遵义”的新闻列表
	 * @param title
	 * @return
	 */
	public List<NewsModel> findByTitleLike(String title);
	/**
	 * 查询姓”李”的编辑在 2017 年 10 月 10 号到 2017 年 10 月 15 号之间发表的新闻，并根据新闻发表时间降序
	 * @param title
	 * @param beginDate
	 * @param endDate
	 * @return
	 */
	public List<NewsModel> findByTitleLikeAndCreateDateGreaterThanAndCreateDateLessThanOrderByCreateDateDesc(String title,Date beginDate,Date 
endDate);
}
```

## NewsRepository.java

```
package online.qsx.repository;
import java.util.Date;
import java.util.List;
import org.springframework.data.repository.Repository;
import online.qsx.model.NewsModel;
public interface NewsRepository extends Repository<NewsModel, Long> {
	/**
	 * 查询新闻标题中包含“遵义”的新闻列表
	 * @param title
	 * @return
	 */
	public List<NewsModel> findByTitleLike(String title);
	/**
	 * 查询姓”李”的编辑在 2017 年 10 月 10 号到 2017 年 10 月 15 号之间发表的新闻，并根据新闻发表时间降序
	 * @param title
	 * @param beginDate
	 * @param endDate
	 * @return
	 */
	public List<NewsModel> findByTitleLikeAndCreateDateGreaterThanAndCreateDateLessThanOrderByCreateDateDesc(String title,Date beginDate,Date
endDate);
}
```

## TestRepository.java

```
package online.qsx.test;
import java.text.ParseException;
import java.text.SimpleDateFormat;
import java.util.Date;
import java.util.List;
import org.springframework.context.ApplicationContext;
import org.springframework.context.support.ClassPathXmlApplicationContext;
import online.qsx.model.NewsModel;
import online.qsx.repository.NewsRepository;
```

```
public class TestRepository {
	// 加载 spring data jpa  配置文件
	ApplicationContext ac = new ClassPathXmlApplicationContext("classpath:applicationContext-jdbc.xml","classpath:applicationContext-jpa.xml");
	// 读取指定的接口
	NewsRepository newsRepository = ac.getBean(NewsRepository.class);

	/**
	 *  查询新闻标题中包含“遵义”的新闻列表
	 */
	public void findByTitle() {
		List<NewsModel> list = newsRepository.findByTitleLike("%遵义%");
		for (NewsModel newsModel : list) {
			System.out.println(newsModel);
		}
	}

	/**
	 *  查询姓”李”的编辑在 2017 年 10 月 10 号到 2017 年 10 月 15 号之间发表的新闻，并根据新闻发表时间降序
	 */
	public void findByTitleAndCreateDate() throws ParseException {
		SimpleDateFormat sdf = new SimpleDateFormat("yyyy-MM-dd");
		Date beginDate = sdf.parse("2017-10-10");
		Date endDate = sdf.parse("2017-10-15");
		List<NewsModel>   list   =   newsRepository.findByTitleLikeAndCreateDateGreaterThanAndCreateDateLessThanOrderByCreateDateDesc("% 遵
义%", beginDate,endDate);
		for (NewsModel newsModel : list) {
			System.out.println(newsModel);
		}
	}

	public static void main(String[] args) throws ParseException {
		new TestRepository().findByTitle();
	}

}
```

## CrudRepository  组件优化 CRUD

## 源码分析

```
@NoRepositoryBean
public interface CrudRepository<T, ID extends Serializable> extends Repository<T, ID> {
        <S extends T> S save(S entity);
        <S extends T> Iterable<S> save(Iterable<S> entities);
        T findOne(ID id);
        boolean exists(ID id);
        Iterable<T> findAll();
        Iterable<T> findAll(Iterable<ID> ids);
        long count();
        void delete(ID id);
        void delete(T entity);
        void delete(Iterable<? extends T> entities);
        void deleteAll();
}
```

### CrudRepository.java

```
package org.springframework.data.repository;
import java.io.Serializable;
@NoRepositoryBean
public interface CrudRepository<T, ID extends Serializable> extends Repository<T, ID> {
        <S extends T> S save(S entity);
        <S extends T> Iterable<S> save(Iterable<S> entities);
        T findOne(ID id);
        boolean exists(ID id);
        Iterable<T> findAll();
        Iterable<T> findAll(Iterable<ID> ids);
        long count();
        void delete(ID id);
        void delete(T entity);
        void delete(Iterable<? extends T> entities);
        void deleteAll();
}
```

## 示例

### 配置文件

#### pom.xml

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

### applicationContext-jdbc.xml

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

### applicationContext-jpa.xml

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

### news.sql

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

## 源码文件

### MySQL5InnoDBUTF8Dialect.java

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

### NewsModel.java

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

### NewsCrudRepository.java

```
package online.qsx.repository;

import org.springframework.data.repository.CrudRepository;

import online.qsx.model.NewsModel;

public interface NewsCrudRepository extends CrudRepository<NewsModel, Long> {

}
```

### TestCrudRepository.java

```
package online.qsx.test;

import java.util.Date;
import java.util.Iterator;

import org.springframework.context.ApplicationContext;

import org.springframework.context.support.ClassPathXmlApplicationContext;

import online.qsx.model.NewsModel;

import online.qsx.repository.NewsCrudRepository;

public class TestCrudRepository {

	// 加载 spring data jpa 配置文件

	ApplicationContext ac = new ClassPathXmlApplicationContext("classpath:applicationContext-jdbc.xml","classpath:applicationContext-jpa.xml");

	// 读取指定的接口

	NewsCrudRepository newsCrudRepository = ac.getBean(NewsCrudRepository.class);


	/**

	 * 保存,save 方法 save 的数据不存在 ID 就是保存

	 */

	public void save() {

		newsCrudRepository.save(new NewsModel("遵义下鹅毛大雪了", "enal", "xxxx", "xxxx", new Date(), new Date()));

	}


	/**

	 * 修改,save 方法 save 的数据存在 ID 就是修改

	 */

	public void edit() {

		newsCrudRepository.save(new NewsModel(6L,"遵义下鹅毛大雪了", "enal", "xxxx", "xxxx", new Date(), new Date()));

	}


	/**

	 * 根据 ID 删除

	 */

	public void remove() {

		newsCrudRepository.delete(new NewsModel(7L));

	}


	/**

	 * 查看列表

	 */

	public void findAll() {

		Iterable<NewsModel> collection = newsCrudRepository.findAll();

		for (Iterator iterator = collection.iterator(); iterator.hasNext();) {

			NewsModel newsModel = (NewsModel) iterator.next();

			System.out.println(newsModel);

		}

	}


	/**
```

```
    * 根据 ID 查看一个
    */
   public void findOne() {
         NewsModel newsModel=newsCrudRepository.findOne(1L);
         System.out.println(newsModel);
   }

   public static void main(String[] args) {
         new TestCrudRepository().findAll();
   }
}
```

## PagingAndSortingRepository 组件优化分页,排序

## 源码分析

### PagingAndSortingRepository.java

```
package org.springframework.data.repository;
import java.io.Serializable;
import org.springframework.data.domain.Page;
import org.springframework.data.domain.Pageable;
import org.springframework.data.domain.Sort;
@NoRepositoryBean
public interface PagingAndSortingRepository<T, ID extends Serializable> extends CrudRepository<T, ID> {

   Iterable<T> findAll(Sort sort);

   Page<T> findAll(Pageable pageable);
}
```

## 示例

### 配置文件

#### pom.xml

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

#### applicationContext-jdbc.xml

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

#### applicationContext-jpa.xml

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

#### news.sql

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

### 源码文件

#### MySQL5InnoDBUTF8Dialect.java

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

#### NewsModel.java

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

#### NewsPagingAndSortingRepository.java

```
package online.qsx.repository;
```

```java
import org.springframework.data.repository.PagingAndSortingRepository;
import online.qsx.model.NewsModel;
public interface NewsPagingAndSortingRepository extends PagingAndSortingRepository<NewsModel, Long> {
}
```

## TestPagingAndSortingRepository.java

```java
package online.qsx.test;


import java.util.List;
import org.springframework.context.ApplicationContext;
import org.springframework.context.support.ClassPathXmlApplicationContext;
import org.springframework.data.domain.Page;
import org.springframework.data.domain.PageRequest;
import org.springframework.data.domain.Sort;
import org.springframework.data.domain.Sort.Direction;
import org.springframework.data.domain.Sort.Order;
import online.qsx.model.NewsModel;
import online.qsx.repository.NewsPagingAndSortingRepository;


public class TestPagingAndSortingRepository {
	// 加载 spring data jpa 配置文件
	ApplicationContext ac = new ClassPathXmlApplicationContext("classpath:applicationContext-jdbc.xml","classpath:applicationContext-jpa.xml");
	// 读取指定的接口


	NewsPagingAndSortingRepository newsPagingAndSortingRepository = ac.getBean(NewsPagingAndSortingRepository.class);


	/**
	 * 分页浏览用户信息，并且根据新闻发布的时间降序
	 * 分页要求每页显示 3 条新闻信息，浏览第 2 页的新闻信息
	 */
	public void findAll() {
		Order orders = new Order(Direction.DESC, "createDate");// 指定排序列
		Sort sort = new Sort(orders);// 实现排序
		PageRequest pageRequest = new PageRequest(2, 3, sort);// 实现分页
		Page<NewsModel> page = newsPagingAndSortingRepository.findAll(pageRequest);// 查询


		System.out.println("总记录数:" + page.getTotalElements());
		System.out.println("总页数:" + page.getTotalPages());
		System.out.println("当前页（request):" + page.getNumber());
		System.out.println("当前页总记录数（request):" + page.getSize());
		System.out.println("当前页记录总数：" + page.getNumberOfElements());
```

```
                List<NewsModel> students = page.getContent();

                for (NewsModel newsModel : students) {

                        System.out.println(newsModel);

                }

        }


        public static void main(String[] args) {

                new TestPagingAndSortingRepository().findAll();

        }


}
```

## JpaRepository 组件对缓存扩展

## 源码分析

### JpaRepository.java

### JpaSpecificationExecutor.java

## 示例

## 配置文件

### pom.xml

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

### applicationContext-jdbc.xml

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

### applicationContext-jpa.xml

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

### news.sql

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

## 源码文件

### MySQL5InnoDBUTF8Dialect.java

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

### NewsModel.java

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

### NewsJpaRepositoryJpaSpecificationExecutor.java

```
package online.qsx.repository;

import org.springframework.data.jpa.repository.JpaRepository;

import org.springframework.data.jpa.repository.JpaSpecificationExecutor;

import online.qsx.model.NewsModel;

public interface NewsJpaRepositoryJpaSpecificationExecutor extends JpaRepository<NewsModel, Long>,JpaSpecificationExecutor<NewsModel> {



}
```

## TestJpaRepositoryJpaSpecificationExecutor.java

```
package online.qsx.test;
import java.util.ArrayList;
import java.util.List;
import javax.persistence.criteria.Predicate;
import org.springframework.context.ApplicationContext;
import org.springframework.context.support.ClassPathXmlApplicationContext;
import org.springframework.data.domain.Page;
import org.springframework.data.domain.PageRequest;
import online.qsx.model.NewsModel;
import online.qsx.repository.NewsJpaRepositoryJpaSpecificationExecutor;

public class TestJpaRepositoryJpaSpecificationExecutor {
    // 加载 spring data jpa 配置文件
    ApplicationContext ac = new ClassPathXmlApplicationContext("classpath:applicationContext-jdbc.xml","classpath:applicationContext-jpa.xml");
    // 读取指定的接口

    NewsJpaRepositoryJpaSpecificationExecutor                    newsJpaRepositoryJpaSpecificationExecutor                    =
ac.getBean(NewsJpaRepositoryJpaSpecificationExecutor.class);

    /**
     * 查询标题中包含”遵义”的新闻，并且根据新闻的发表时间升序
     * 分页要求每页显示 2 条新闻信息，浏览第 2 页的新闻信息
     */
    public void findAll() {

        Page<NewsModel> page =newsJpaRepositoryJpaSpecificationExecutor.findAll((root, query, cb) -> {
            // 添加条件
            List<Predicate> param = new ArrayList<Predicate>();
            param.add(cb.like(root.get("title").as(String.class), "%遵义%"));

            // 查询添加排序
            query.orderBy(cb.desc(root.get("createDate")), cb.desc(root.get("createDate")));

            // 转换成 JPA 的条件对象
            Predicate[] predicates = new Predicate[param.size()];
            predicates = param.toArray(predicates);
            return cb.and(predicates);
        },new PageRequest(2, 2));

        System.out.println("总记录数:" + page.getTotalElements());
        System.out.println("总页数:" + page.getTotalPages());
```

```
            System.out.println("当前页（request):" + page.getNumber());

            System.out.println("当前页总记录数（request):" + page.getSize());

            System.out.println("当前页记录总数：" + page.getNumberOfElements());

            List<NewsModel> students = page.getContent();

            for (NewsModel newsModel : students) {

                  System.out.println(newsModel);

            }

      }


      public static void main(String[] args) {

            new TestJpaRepositoryJpaSpecificationExecutor().findAll();

      }


}
```

## JpaSpecificationExecutor 组件对动态条件的扩展

结合 JpaRepository 组件对缓存扩展看

## Repository 组件优化数据访问自定义 SQL

## 源码分析

### Repository.java

```
package org.springframework.data.repository;
import java.io.Serializable;
public interface Repository<T, ID extends Serializable> {
}
```

## 示例

### 配置文件

#### pom.xml

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

#### applicationContext-jdbc.xml

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

#### applicationContext-jpa.xml

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

#### news.sql

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

### 源码文件

#### MySQL5InnoDBUTF8Dialect.java

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

#### NewsModel.java

参考：初始 Spring Data JPA + Hibernate 实现→Spring Data JPA 依赖→下的同名文件

#### NewsRepository.java

```
package online.qsx.repository;
```

```
import java.util.Date;
import java.util.List;
import org.springframework.data.jpa.repository.Modifying;
import org.springframework.data.jpa.repository.Query;
import org.springframework.data.repository.Repository;
import org.springframework.data.repository.query.Param;
import org.springframework.transaction.annotation.Transactional;
import online.qsx.model.NewsModel;
public interface NewsRepository extends Repository<NewsModel, Long> {

	// a)  使用@Query 定义 JPQL 查询新闻作者包含“a”的新闻信息并且根据发表时间降序
	@Query(value="from NewsModel where author like ?1 order by createDate desc")
	public List<NewsModel> findListByAuthor(String author);

	// b)  使用@Query 定义 SQL 查询发表时间在 2017 年 10 月 1 日-2017 年 10 月 31 日之间的新闻,并根据发表日期升序
	@Query(nativeQuery=true,value="select * from tb_news where createDate > ?1 and createDate < ?2 order by createDate asc")
	public List<NewsModel> findListByCreateDates(Date beginDate, Date endDate);

	// c)  使用@Query 定义 JPQL 修改编号为 1 的新闻，新闻标题改成"贵州遵义下起千年一遇的鹅毛大雪"
	@Transactional //事物
	@Modifying //增删改需要
	@Query(value="update NewsModel set title=:title where id=:id")
	public void edit(@Param("title")String title,@Param("id")Long id);

}
```

## TestRepository.java

```
package online.qsx.test;


import java.text.ParseException;
import java.text.SimpleDateFormat;
import java.util.List;
import org.springframework.context.ApplicationContext;
import org.springframework.context.support.ClassPathXmlApplicationContext;
import online.qsx.model.NewsModel;
import online.qsx.repository.NewsRepository;


public class TestRepository {
	//  加载 spring data jpa  配置文件
	ApplicationContext ac = new ClassPathXmlApplicationContext("classpath:applicationContext-jdbc.xml","classpath:applicationContext-jpa.xml");
	// 读取指定的接口

	NewsRepository newsRepository = ac.getBean(NewsRepository.class);

	/**
	 * 使用@Query 定义 JPQL 查询新闻作者包含“a”的新闻信息并且根据发表时间降序
	 */
	public void findListByAuthor() {
		List<NewsModel> list = newsRepository.findListByAuthor("%a%");
		for (NewsModel newsModel : list) {
			System.out.println(newsModel);
		}
	}

	/**
	 * 使用@Query 定义 SQL 查询发表时间在 2017 年 10 月 1 日-2017 年 10 月 31 日之间的新闻,并根据发表日期升序
	 *
	 * @throws ParseException
	 */
	public void findListByCreateDates() throws ParseException {
		SimpleDateFormat sdf = new SimpleDateFormat("yyyy-MM-dd");
		List<NewsModel> list = newsRepository.findListByCreateDates(sdf.parse("2017-10-01"), sdf.parse("2017-10-31"));
		for (NewsModel newsModel : list) {
			System.out.println(newsModel);
		}
	}

	/**
	 * 使用@Query 定义 JPQL 修改编号为 1 的新闻，新闻标题改成""
	 */
	public void edit() {
		newsRepository.edit("贵州遵义下起千年一遇的鹅毛大雪", 1L);
	}

	public static void main(String[] args) throws ParseException {
		new TestRepository().findListByCreateDates();
	}

}
```

## JPA 实现多表动态条件分页查询

## 配置文件:

### pom.xml

```xml
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
  <modelVersion>4.0.0</modelVersion>
  <groupId>online.qsx</groupId>
  <artifactId>Jpa06ManyTablesQuery</artifactId>
  <version>0.0.1-SNAPSHOT</version>
  <properties>
          <!-- spring版本号 -->
          <spring.version>4.3.8.RELEASE</spring.version>
          <!-- spring data jpa 版本号 -->
          <spring-data-jpa.version>1.10.1.RELEASE</spring-data-jpa.version>
          <!-- hibernate 版本号 -->
          <hibernate.version>5.1.0.Final</hibernate.version>
          <!-- mysql 版本号 -->
          <mysql.version>5.1.38</mysql.version>
      </properties>
      <dependencies>
          <!-- spring ioc -->
          <dependency>
                <groupId>org.springframework</groupId>
                <artifactId>spring-core</artifactId>
                <version>${spring.version}</version>
          </dependency>
          <!-- spring mvc -->
          <dependency>
                <groupId>org.springframework</groupId>
                <artifactId>spring-webmvc</artifactId>
                <version>${spring.version}</version>
          </dependency>
          <!-- spring orm -->
          <dependency>
                <groupId>org.springframework</groupId>
                <artifactId>spring-tx</artifactId>
                <version>${spring.version}</version>
          </dependency>
          <dependency>
```

```
				<groupId>org.springframework</groupId>
				<artifactId>spring-jdbc</artifactId>
				<version>${spring.version}</version>
			</dependency>
			<dependency>
				<groupId>org.springframework</groupId>
				<artifactId>spring-orm</artifactId>
				<version>${spring.version}</version>
			</dependency>
			<!-- spring data jpa -->
			<dependency>
				<groupId>org.springframework.data</groupId>
				<artifactId>spring-data-jpa</artifactId>
				<version>${spring-data-jpa.version}</version>
			</dependency>
			<!-- hibernate -->
			<dependency>
				<groupId>org.hibernate</groupId>
				<artifactId>hibernate-core</artifactId>
				<version>${hibernate.version}</version>
			</dependency>
			<!-- hibernate jpa -->
			<dependency>
				<groupId>org.hibernate</groupId>
				<artifactId>hibernate-entitymanager</artifactId>
				<version>${hibernate.version}</version>
			</dependency>
			<!-- mysql -->
			<dependency>
				<groupId>mysql</groupId>
				<artifactId>mysql-connector-java</artifactId>
				<version>${mysql.version}</version>
			</dependency>
		</dependencies>
</project>
```

## applicationContext-jdbc.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<beans xmlns="http://www.springframework.org/schema/beans"
	xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
	xmlns:jdbc="http://www.springframework.org/schema/jdbc"
```

```
      xsi:schemaLocation="
      http://www.springframework.org/schema/beans
       http://www.springframework.org/schema/beans/spring-beans.xsd
       http://www.springframework.org/schema/jdbc
       http://www.springframework.org/schema/jdbc/spring-jdbc.xsd  ">

      <jdbc:initialize-database data-source="dataSource">
            <jdbc:script location="classpath:jpa.sql" />
      </jdbc:initialize-database>

</beans>
```

## applicationContext-jpa.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<beans xmlns="http://www.springframework.org/schema/beans"
      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:context="http://www.springframework.org/schema/context"
      xmlns:tx="http://www.springframework.org/schema/tx" xmlns:jpa="http://www.springframework.org/schema/data/jpa"
      xsi:schemaLocation="http://www.springframework.org/schema/beans
http://www.springframework.org/schema/beans/spring-beans.xsd
            http://www.springframework.org/schema/data/jpa
http://www.springframework.org/schema/data/jpa/spring-jpa-1.3.xsd
            http://www.springframework.org/schema/tx http://www.springframework.org/schema/tx/spring-tx-4.0.xsd
            http://www.springframework.org/schema/context
http://www.springframework.org/schema/context/spring-context-4.0.xsd  ">

      <!--1 配置数据源 -->
      <bean id="dataSource" class="org.springframework.jdbc.datasource.DriverManagerDataSource">
            <property name="driverClassName" value="com.mysql.jdbc.Driver" />
            <property name="username" value="root" />
            <property name="password" value="root" />
            <property name="url" value="jdbc:mysql:///test?characterEncoding=UTF-8" />
      </bean>

      <!--2 配置EntityManagerFactory -->
      <bean id="entityManagerFactory" class="org.springframework.orm.jpa.LocalContainerEntityManagerFactoryBean">
            <!-- 数据源 -->
            <property name="dataSource" ref="dataSource" />
            <!-- JPA只是一个规范,使用其中的是一个实现 HibernateJpaVendorAdapter -->
            <property name="jpaVendorAdapter">
                  <bean class="org.springframework.orm.jpa.vendor.HibernateJpaVendorAdapter" />
            </property>
            <!-- 扫描JPA存在的实体 -->
            <property name="packagesToScan" value="online.qsx.model" />
            <!-- Hibernate 参数的配置 -->
            <property name="jpaProperties">
                  <props>
                        <prop key="hibernate.ejb.naming_strategy">org.hibernate.cfg.ImprovedNamingStrategy</prop>
                        <prop key="hibernate.dialect">online.qsx.common.MySQL5InnoDBUTF8Dialect</prop>
                        <prop key="hibernate.show_sql">true</prop>
                        <prop key="hibernate.format_sql">true</prop>
                        <prop key="hibernate.hbm2ddl.auto">update</prop>
                  </props>
            </property>

      </bean>

      <!--3 配置事务管理器 -->
      <bean id="transactionManager" class="org.springframework.orm.jpa.JpaTransactionManager">
            <property name="entityManagerFactory" ref="entityManagerFactory" />
      </bean>

      <!--4 配置支持注解的事务 -->
      <tx:annotation-driven transaction-manager="transactionManager" />

      <!--5 扫描包,识别数据库访问 配置spring data -->
      <jpa:repositories base-package="online.qsx.repository" entity-manager-factory-ref="entityManagerFactory" />

</beans>
```

## jpa.sql

```
USE `test`;


DROP TABLE IF EXISTS `tb_order`;


DROP TABLE IF EXISTS `tb_user`;


CREATE TABLE IF NOT EXISTS `tb_user` (
  `id` bigint(20) NOT NULL AUTO_INCREMENT,
  `createDate` date DEFAULT NULL,
  `loginName` varchar(255) DEFAULT NULL,
  `password` varchar(255) DEFAULT NULL,
  PRIMARY KEY (`id`)
) ENGINE=InnoDB AUTO_INCREMENT=12 DEFAULT CHARSET=utf8;


INSERT INTO `tb_user` (`id`, `createDate`, `loginName`, `password`) VALUES
      (1, '2017-10-15', 'admin', '123456'),
      (2, '2017-10-16', 'system', '1234565'),
      (3, '2017-10-16', 'a', '1234565'),
      (4, '2017-10-14', 'asda', '1234565'),
      (5, '2017-10-16', 'asdas', '1234565'),
      (6, '2017-10-18', 'sadfas', '1234565'),
      (7, '2017-10-15', 'safsaf', '1234565'),
      (8, '2017-10-18', 'asfasf', '1234565'),
      (9, '2017-10-16', 'asfasf', '1234565'),
      (10, '2017-10-15', 'asfasfda', '1234565'),
      (11, '2017-10-15', 'asfa', '1234565');



CREATE TABLE IF NOT EXISTS `tb_order` (
  `id` bigint(20) NOT NULL AUTO_INCREMENT,
  `code` varchar(255) DEFAULT NULL,
  `createDate` date DEFAULT NULL,
  `user_id` bigint(20) DEFAULT NULL,
  PRIMARY KEY (`id`),
  KEY `FK2p4n9ciui39792tk5qdpcxq1w` (`user_id`),
  CONSTRAINT `FK2p4n9ciui39792tk5qdpcxq1w` FOREIGN KEY (`user_id`) REFERENCES `tb_user` (`id`)
) ENGINE=InnoDB AUTO_INCREMENT=13 DEFAULT CHARSET=utf8;


INSERT INTO `tb_order` (`id`, `code`, `createDate`, `user_id`) VALUES
      (1, 'aadsa', '2017-10-18', 1),
      (2, 'sad', '2017-10-18', 1),
      (3, 'asf', '2017-10-18', 1),
      (4, '34asf', '2017-10-18', 1),
      (5, 'asdas', '2017-10-18', 1),
      (6, 'sadg', '2017-10-18', 1),
      (7, 'asdfgsag', '2017-10-18', 4),
      (8, 'asdgf', '2017-10-18', 8),
      (9, 'adsg', '2017-10-18', 1),
      (10, 'agds', '2017-10-18', 1),
      (11, 'adsga', '2017-10-18', 11),
      (12, 'dasdas', '2017-10-18', 11);
```

# 源码文件:

## MySQL5InnoDBUTF8Dialect.java

```
package online.qsx.common;
import org.hibernate.dialect.MySQL5Dialect;
/**
 * 引擎 InnoDB
 * 字符集 UTF-8
 */
public class MySQL5InnoDBUTF8Dialect extends MySQL5Dialect {
	@Override
	public String getTableTypeString() {
		return " ENGINE=InnoDB DEFAULT CHARSET=UTF8";
	}
}
```

## OrderModel.java

```
package online.qsx.model;
import java.util.Date;
import javax.persistence.CascadeType;
import javax.persistence.Entity;
import javax.persistence.FetchType;
import javax.persistence.GeneratedValue;
import javax.persistence.GenerationType;
import javax.persistence.Id;
import javax.persistence.JoinColumn;
import javax.persistence.ManyToOne;
import javax.persistence.Table;
import javax.persistence.Temporal;
import javax.persistence.TemporalType;
/**
 * 订单
 */
@Entity
@Table(name = "tb_order")
public class OrderModel {
	@Id
	@GeneratedValue(strategy = GenerationType.IDENTITY)
```

```
private Long id;
// 订单号
private String code;
// 订单创建时间
@Temporal(TemporalType.DATE)
private Date createDate;
// 特殊属性一个订单属于一个用户
@ManyToOne(cascade = CascadeType.ALL, fetch = FetchType.EAGER)
@JoinColumn(name = "user_id")
private UserModel user;

public String getCode() {
        return code;
}
public void setCode(String code) {
        this.code = code;
}
public Date getCreateDate() {
        return createDate;
}
public void setCreateDate(Date createDate) {
        this.createDate = createDate;
}
public Long getId() {
        return id;
}
public void setId(Long id) {
        this.id = id;
}
public UserModel getUser() {
        return user;
}
public void setUser(UserModel user) {
        this.user = user;
}
public OrderModel(String code, Date createDate) {
        super();
        this.code = code;
        this.createDate = createDate;
}
public OrderModel() {
        super();
}
```

```
	@Override
	public String toString() {
		return "Order [id=" + id + ", code=" + code + ", createDate=" + createDate + "]";
	}

	public String toStringAndUser() {
		return "Order [id=" + id + ", code=" + code + ", createDate=" + createDate + ",user=" + user+ "]";
	}
}
```

## UserModel.Java

```
package online.qsx.model;
import java.util.Date;
import java.util.HashSet;
import java.util.Set;
import javax.persistence.CascadeType;
import javax.persistence.Entity;
import javax.persistence.FetchType;
import javax.persistence.GeneratedValue;
import javax.persistence.GenerationType;
import javax.persistence.Id;
import javax.persistence.JoinColumn;
import javax.persistence.OneToMany;
import javax.persistence.Table;
import javax.persistence.Temporal;
import javax.persistence.TemporalType;
/**
 * 用户
 */
@Entity
@Table(name = "tb_user")
public class UserModel {
	@Id
	@GeneratedValue(strategy = GenerationType.IDENTITY)
	private Long id;
	// 账号
	private String loginName;
	// 密码
	private String password;
	// 用户创建时间
	@Temporal(TemporalType.DATE)
```

```
private Date createDate;

//  特殊属性一个用户拥有多个订单

@OneToMany(cascade = CascadeType.ALL, fetch = FetchType.EAGER)

@JoinColumn(name = "user_id")

private Set<OrderModel> orders = new HashSet<OrderModel>();


public Long getId() {

        return id;

}

public void setId(Long id) {

        this.id = id;

}

public String getLoginName() {

        return loginName;

}

public void setLoginName(String loginName) {

        this.loginName = loginName;

}

public String getPassword() {

        return password;

}

public void setPassword(String password) {

        this.password = password;

}

public Date getCreateDate() {

        return createDate;

}


public void setCreateDate(Date createDate) {

        this.createDate = createDate;

}


public Set<OrderModel> getOrders() {

        return orders;

}


public void setOrders(Set<OrderModel> orders) {

        this.orders = orders;

}


public UserModel(String loginName, String password, Date createDate) {

        super();

        this.loginName = loginName;

        this.password = password;
```

```
			this.createDate = createDate;
		}

		public UserModel() {
			super();
		}

		@Override
		public String toString() {
			return "User [id=" + id + ", loginName=" + loginName + ", password=" + password + ", createDate=" + createDate
					+ "]";
		}

		public String toStringAndOrders() {
			return "User [id=" + id + ", loginName=" + loginName + ", password=" + password + ", createDate=" + createDate
					+ ",orders=" + orders + "]";
		}
}
```

## UserRepository.java

```
package online.qsx.repository;
import org.springframework.data.jpa.repository.JpaRepository;
import org.springframework.data.jpa.repository.JpaSpecificationExecutor;
import online.qsx.model.UserModel;
public interface UserRepository extends JpaRepository<UserModel, Long>,JpaSpecificationExecutor<UserModel> {
}
```

## TestRepository.java

```
package online.qsx.test;
import java.util.ArrayList;
import java.util.List;
import javax.persistence.criteria.Join;
import javax.persistence.criteria.JoinType;
import javax.persistence.criteria.Predicate;
import org.springframework.context.ApplicationContext;
import org.springframework.context.support.ClassPathXmlApplicationContext;
import org.springframework.data.domain.Page;
import org.springframework.data.domain.PageRequest;
import org.springframework.data.domain.Pageable;
import org.springframework.data.domain.Sort;
import org.springframework.data.domain.Sort.Order;
import org.springframework.data.domain.Sort.Direction;
import online.qsx.model.OrderModel;
import online.qsx.model.UserModel;
import online.qsx.repository.UserRepository;
public class TestRepository {
	// 加载 spring data jpa 配置文件
	ApplicationContext ac = new ClassPathXmlApplicationContext("classpath:applicationContext-jdbc.xml","classpath:applicationContext-jpa.xml");
	// 读取指定的接口
	UserRepository userRepository = ac.getBean(UserRepository.class);
	// Specification
	// public abstract Predicate toPredicate(Root root, CriteriaQuery query,
	// CriteriaBuilder cb);
	// CriteriaQuery<?> query 查询
	// Root<UserModel> root 条件对象主体
	// CriteriaBuilder cb 构建条件的工具
	/**
	 * 基础动态查询
	 *
	 * @param userModel
	 * @return
	 */
	public List<UserModel> findUser(UserModel userModel) {
		return userRepository.findAll((root, query, cb) -> {
			// 动态条件的集合
			List<Predicate> predicates = new ArrayList<Predicate>();

			// 动态构建条件
			if (userModel.getLoginName() != null) {
				Predicate predicate = cb.like(root.get("loginName"), "%" + userModel.getLoginName() + "%");
				predicates.add(predicate);
			}
			if (userModel.getPassword() != null) {
				Predicate predicate = cb.equal(root.get("password"), userModel.getPassword());
				predicates.add(predicate);
			}
			if (userModel.getId() != null) {
				Predicate predicate = cb.equal(root.get("id"), userModel.getId());
				predicates.add(predicate);
			}
			// 设置查询的条件
			query.where(predicates.toArray(new Predicate[predicates.size()]));
```

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                        return null;
                });
        }

        /**
         *  连表的动态查询
         * @param userModel
         * @return
         */
        public List<UserModel> findUserAndOrder(UserModel userModel) {
                return userRepository.findAll((root, query, cb) -> {
                        // 动态条件的集合
                        List<Predicate> predicates = new ArrayList<Predicate>();
                        // 连表
                        // JoinType.INNER inner join
                        // JoinType.LEFT left join
                        // JoinType.RIGHT right join
                        Join<Object, Object> join = root.join("orders", JoinType.INNER);
                        // 动态构建条件
                        // UserModel
                        if (userModel.getLoginName() != null) {
                                Predicate predicate = cb.like(root.get("loginName"), "%" + userModel.getLoginName() + "%");
                                predicates.add(predicate);
                        }
                        if (userModel.getPassword() != null) {
                                Predicate predicate = cb.equal(root.get("password"), userModel.getPassword());
                                predicates.add(predicate);
                        }
                        // OrderModel
                        if (userModel.getOrders() != null && new ArrayList<OrderModel>(userModel.getOrders()).get(0) != null&& new
ArrayList<OrderModel>(userModel.getOrders()).get(0).getCode() != null) {
                                Predicate predicate = cb.like(join.get("code"),
                                                "%" + new ArrayList<OrderModel>(userModel.getOrders()).get(0).getCode() + "%");
                                predicates.add(predicate);
                        }
                        // 设置查询的条件
                        query.where(predicates.toArray(new Predicate[predicates.size()]));
                        return null;
                });
        }

        /**
         *  分页连表的动态查询,数据分页
```

```
     *
     * @param userModel
     * @return
     */
    public List<UserModel> findUserAndOrderPageOrder(UserModel userModel) {
        // 排序
        Sort sort = new Sort(new ArrayList<Order>() {
            {
                add(new Order(Direction.DESC, "createDate"));// 指定排序列
            }
        });
        // 分页
        Pageable pageable = new PageRequest(0, 10, sort);
        // 条件查询
        Page<UserModel> page = userRepository.findAll((root, query, cb) -> {
            // 动态条件的集合
            List<Predicate> predicates = new ArrayList<Predicate>();
            // 连表
            // JoinType.INNER inner join
            // JoinType.LEFT left join
            // JoinType.RIGHT right join
            Join<Object, Object> join = root.join("orders", JoinType.INNER);
            // 动态构建条件
            // UserModel
            if (userModel.getLoginName() != null) {
                Predicate predicate = cb.like(root.get("loginName"), "%" + userModel.getLoginName() + "%");
                predicates.add(predicate);
            }
            if (userModel.getPassword() != null) {
                Predicate predicate = cb.equal(root.get("password"), userModel.getPassword());
                predicates.add(predicate);
            }
            // OrderModel
            if (userModel.getOrders() != null && new ArrayList<OrderModel>(userModel.getOrders()).get(0) != null&& new
ArrayList<OrderModel>(userModel.getOrders()).get(0).getCode() != null) {
                Predicate predicate = cb.like(join.get("code"),
                        "%" + new ArrayList<OrderModel>(userModel.getOrders()).get(0).getCode() + "%");
                predicates.add(predicate);
            }
            // 设置查询的条件
            query.where(predicates.toArray(new Predicate[predicates.size()]));
            return null;
        }, pageable);
        // 分页信息
```

```
		System.out.println("总记录数:" + page.getTotalElements());
		System.out.println("总页数:" + page.getTotalPages());
		System.out.println("当前页（request):" + page.getNumber());
		System.out.println("当前页总记录数（request):" + page.getSize());
		System.out.println("当前页记录总数：" + page.getNumberOfElements());
		return page.getContent();
	}

	public static void main(String[] args) {
		UserModel userModel = new UserModel("a", null, null);
		userModel.getOrders().add(new OrderModel("a", null));
		List<UserModel> list = new TestRepository().findUserAndOrderPageOrder(userModel);
		for (UserModel temp : list) {
			System.out.println(temp.toStringAndOrders());
		}
	}
}
```