开发人员：玉耀臣

Git地址：https://github.com/yyc19980227/SpringBoot-Web-Demo.git

在线体验系统：http://101.201.237.88:8081/ 在线系统的数据库为MySQL数据库，本地的是Oracle数据库

项目主题：微人事管理

账号：

管理员账号：username：1 password： 1

普通用户：username：职员姓名 password：默认为 1

例如 账号：坤坤二号 密码：222

需求分析：该系统主要由管理员处理对员工数据增删查改，以及对这些数据的分析由前端页面柱形图、饼图、折线图直观分析结果，所以数据库设计应该为角色表，管理员账号表，角色权限表 ，员工表

技术选型：敏捷型开发选择**Spring boot**框架，SpringBoot是为了简化Spring应用的创建、运行、调试、部署等而出现的，使用它可以做到专注于Spring应用的开发，而无需过多关注XML的配置，简单来说，springboo提供了一堆依赖打包，并且已经按照习惯解决了依赖问题；

SpringBoot默认使用tomcat作为服务器，使用logback提供日志记录；

SpringBoot提供了一系列的依赖包，所以需要构建工具的支持，maven或者gradle；

分析得出本系统功能逻辑一般，没有太多复杂的SQL语句，所以选择Spring data JPA。

JPA的出现主要是为了简化持久层开发以及整合ORM技术，结束Hibernate、TopLink、JDO等ORM框架各自为营的局面。JPA是在吸收现有ORM框架的基础上发展而来，易于使用，伸缩性强。总的来说，JPA包括以下3方面的技术：

- **ORM映射元数据**： 支持XML和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
- **API**： 操作实体对象来执行CRUD操作
- **查询语言**： 通过面向对象而非面向数据库的查询语言（`JPQL`）查询数据，避免程序的SQL语句紧密耦合

使用jpa我们可以在做一般的增删查改中可以直接使用JpaRepository中提供的方法，只需要在Service或Controller中调用即可，对于复杂的SQL操作可以选择自定义查询Using @Query或者原生查询Native Queries，原生查询为直接使用当前SQL语言。

由于决定使用JPA，所以对于选择关系型数据库来说可以选择自己熟悉的，在这里主要使用**Oracle**。

为了降低数据库压力选择**Redis**作为数据缓存。

作为MVC架构的经典选择了**JSP**作为前端。

前端使用的框架主要为**Jquery、Bootstrap、Materialize-UI、layui**，在页面交互中使用Bootstrap，布局和样式选择了Materialize-UI，layui只作为弹窗使用。

这样子的页面风格比较简约，可以直面主题；

系统安全选择Spring security做权限验证，可以做到对角色分配资源、页面控制器。

分页选择NavigationTag对前端的分页排序 显示格式：首页 上一页 1 2 3 4 5下一页 尾页

详细说明：该项目主要是为人事管理企业员工，主要提供了对员工的CURD以及对员工近期一月入职、离职、总在职人数统计、工资范围分析、当年十二个月的人员变动分析。其中集成了Spring Security权限验证，现在开发后台功能主要为管理员权限所用，若开发员工权限页面只需要在数据库增加员工权限即可。

从零搭建Demo

开发环境为Windows10系统

选择IntelliJ IDEA 2019.3.5 x64版本 https://www.jetbrains.com/idea/download/other.html

先去下载一个Maven3.5 https://archive.apache.org/dist/maven/maven-3/3.5.0/source/ 下载，下载完成后解压到本地C盘即可，修改maven配置文件，找到conf文件中settings.xml打开

```
<localRepository>C:/apache-maven-3.5.0/repository</localRepository>
```

这里改maven 本地仓库地址

```
<mirrors>

   <mirror>
      <id>nexus-aliyun</id>
      <name>Nexus aliyun</name>
      <url>http://maven.aliyun.com/nexus/content/groups/public/</url>
      <mirrorOf>central</mirrorOf>
  </mirror>
</mirrors>
```

在mirrors中使用阿里云的镜像，相比于原仓库来说，在国内下载依赖速度飞快，如果不配置这个而是用IDEA的默认maven时 maven打包速度太慢

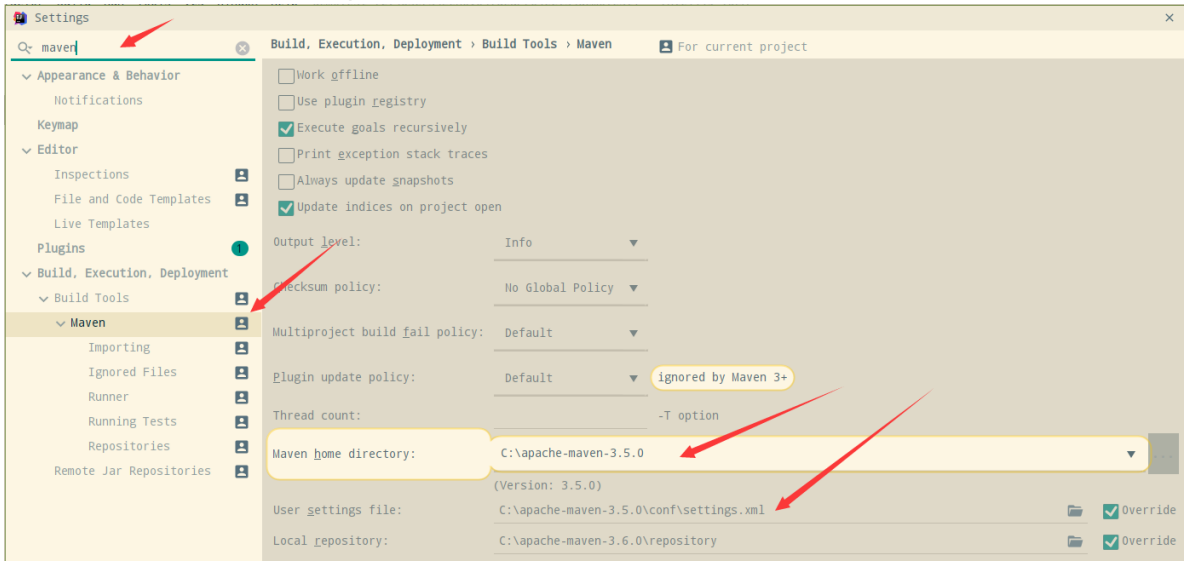
再去下载一个jdk1.8.0_191 版本为1.8以上即可

下载 Redis window版本 百度网盘下载地址 https://pan.baidu.com/s/1z1_OdNVbtgyEjiktqgB83g 密码：kdfq 解压完成后打开cmd指令窗口
3.输入你刚才解压的文件路径
4.然后输入redis-server redis.windows.conf 命令 5随后,进入右击此电脑–管理–服务和应用程序–服务启动服务Redis

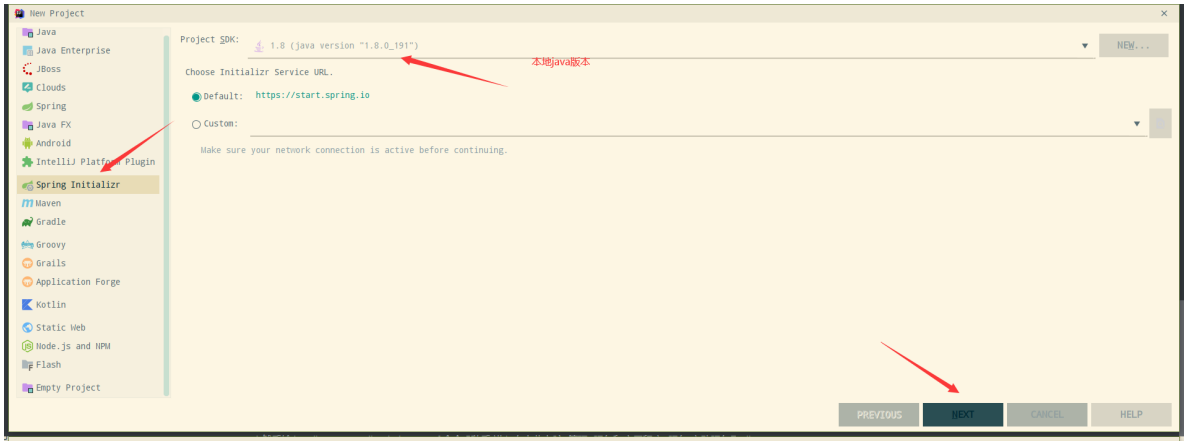
oracle数据库按照百度经验进行下载安装即可

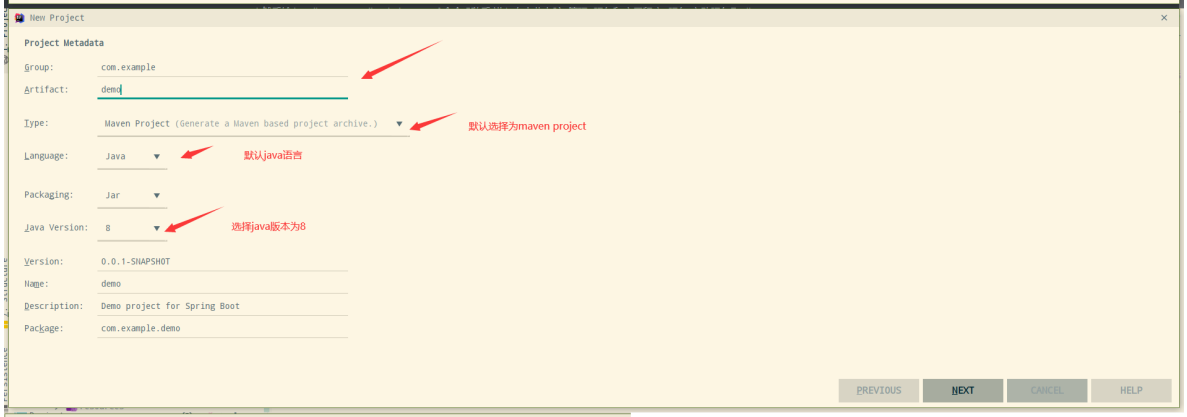
开发环境跟开发工具都已准备好可以打开IDEA

打开左上角的file---选择Settings先去配置maven环境

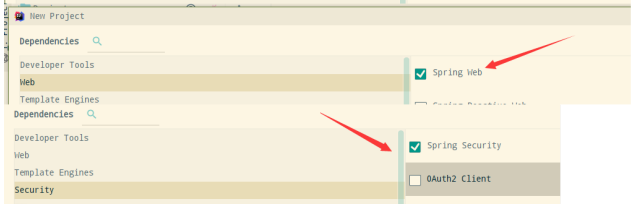


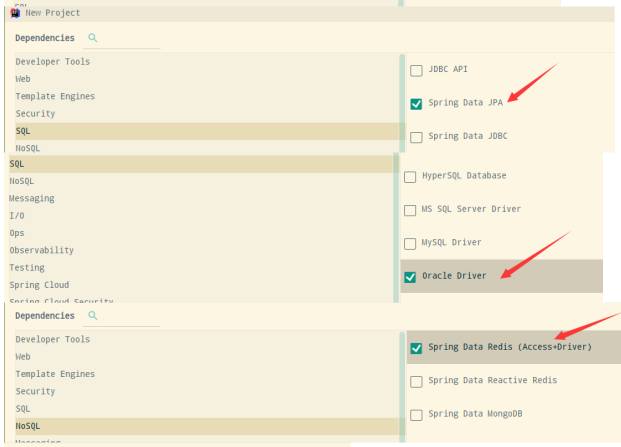
配置完成后按照图片新建项目

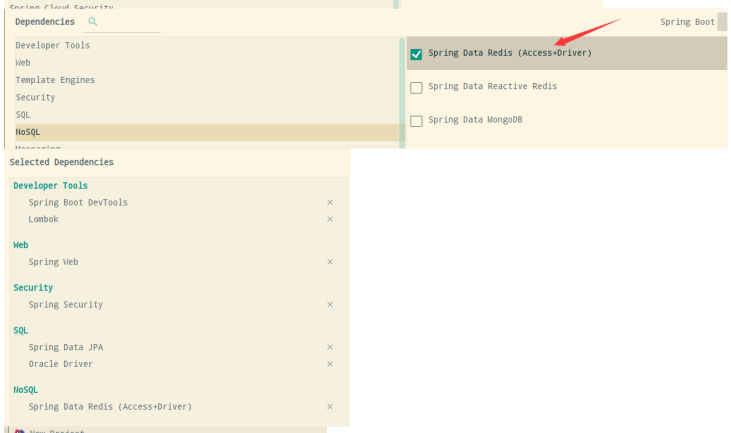

New Project
Java
Java Enterprise
JBoss
Clouds
Spring
Java FX
Android
IntelliJ Platform Plugin
Spring Initializr
Maven
Gradle
Groovy
Grails
Application Forge
Kotlin
Static Web
Node.js and NPM
Flash
Empty Project
Project SDK:
1.8 (java version "1.8.0_191")
NEW...
本地java版本
Choose Initializr Service URL.
Default: https://start.spring.io
Custom:
Make sure your network connection is active before continuing.
PREVIOUS
NEXT
CANCEL
HELP

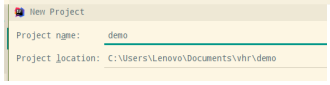

New Project
Project Metadata
Group: com.example
Artifact: demo
Type: Maven Project (Generate a Maven based project archive.)
默认选择为maven project
Language: Java
默认java语言
Packaging: Jar
Java Version: 8
选择java版本为8
Version: 0.0.1-SNAPSHOT
Name: demo
Description: Demo project for Spring Boot
Package: com.example.demo
PREVIOUS
NEXT
CANCEL
HELP


New Project
Dependencies
Developer Tools
Web
Template Engines
Security
SQL
NoSQL
Spring Boot DevTools
选择热部署和Lombok 简化实体类Set Get方法
Lombok
Spring Configuration Processor

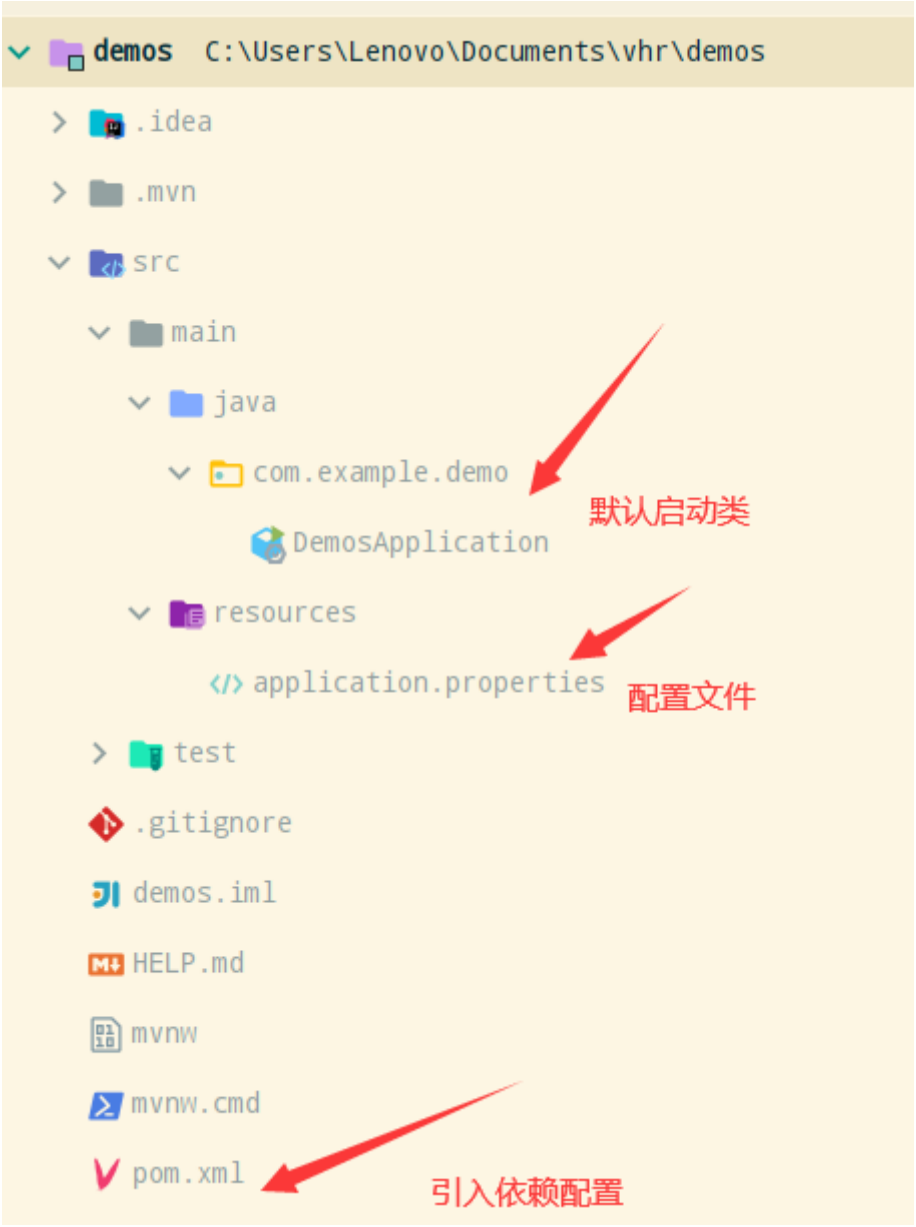

New Project
Dependencies
Developer Tools
Web
Template Engines
Spring Web
Dependencies
Developer Tools
Web
Template Engines
Security
Spring Security
OAuth2 Client


New Project
Dependencies
Developer Tools
Web
Template Engines
Security
SQL
NoSQL
JDBC API
Spring Data JPA
Spring Data JDBC
SQL
NoSQL
Messaging
I/O
Ops
Observability
Testing
Spring Cloud
HyperSQL Database
MS SQL Server Driver
MySQL Driver
Oracle Driver


Dependencies
Spring Boot
Developer Tools
Web
Template Engines
Security
SQL
NoSQL
Spring Data Redis (Access+Driver)
Spring Data Reactive Redis
Spring Data MongoDB
Selected Dependencies
Developer Tools
Spring Boot DevTools
Lombok
Web
Spring Web
Security
Spring Security
SQL
Spring Data JPA
Oracle Driver
NoSQL
Spring Data Redis (Access+Driver)


New Project
Project name: demo
Project location: C:\Users\Lenovo\Documents\vhr\demo

最终生成的项目结果如下



现在先去配置**POM.XML** 引入我们另外需要的依赖，这里需要特别注意的是maven官方库中没有oracle jdbc驱动的问题解决，先到oracle官网下载ojdbc6驱动jar，下载好后，运行maven命令安装jar到本地仓库，在需要引入的maven工程的pom.xml内增加引入即可，具体步骤的可以百度搜索。

```
    <dependencies>
            <!--  JPA-->
        <dependency>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-starter-data-jpa</artifactId>
        </dependency>
        <!-- redis-->
        <dependency>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-starter-data-redis</artifactId>
        </dependency>
        <dependency>
            <groupId>org.springframework.session</groupId>
            <artifactId>spring-session-data-redis</artifactId>
        </dependency>
        <!-- web-->
        <dependency>
```

```
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-starter-web</artifactId>
        </dependency>
        <!-- LOG-->
        <dependency>
              <groupId>org.springframework.boot</groupId>
              <artifactId>spring-boot-starter-logging</artifactId>
              <version>2.3.4.RELEASE</version>
              <scope>compile</scope>
        </dependency>

        <dependency>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-starter-actuator</artifactId>
        </dependency>
<!--            热部署-->
        <dependency>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-devtools</artifactId>
            <scope>true</scope>
            <optional>true</optional>
        </dependency>

        <!-- oracle odbc -->
        <dependency>
            <groupId>com.oracle</groupId>
            <artifactId>ojdbc6</artifactId>
            <version>11.2.0.3</version>
        </dependency>

        <dependency>
            <groupId>com.jayway.jsonpath</groupId>
            <artifactId>json-path</artifactId>
        </dependency>
        <!-- 添加spring-boot-starter-security 依赖 -->
        <dependency>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-starter-security</artifactId>
        </dependency>

        <dependency>
            <groupId>org.springframework.security</groupId>
            <artifactId>spring-security-taglibs</artifactId>
        </dependency>
        <dependency>
            <groupId>org.springframework.security</groupId>
            <artifactId>spring-security-test</artifactId>
        </dependency>
        <!-- 添加 servlet 依赖. -->
        <dependency>
            <groupId>javax.servlet</groupId>
            <artifactId>javax.servlet-api</artifactId>
            <scope>provided</scope>
        </dependency>

        <!-- 添加 JSTL（JSP Standard Tag Library，JSP标准标签库) -->
        <dependency>
            <groupId>javax.servlet</groupId>
```

```
            <artifactId>jstl</artifactId>
        </dependency>

        <!--添加 tomcat 的支持.-->
        <dependency>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-starter-tomcat</artifactId>
            <scope>provided</scope>
        </dependency>

        <!-- Jasper是tomcat中使用的JSP引擎，运用tomcat-embed-jasper可以将项目与tomcat
分开 -->
        <dependency>
            <groupId>org.apache.tomcat.embed</groupId>
            <artifactId>tomcat-embed-jasper</artifactId>
            <scope>provided</scope>
        </dependency>
<!--         string转long类型与 字符串截取-->
        <dependency>
            <groupId>com.google.guava</groupId>
            <artifactId>guava</artifactId>
            <version>21.0</version>
        </dependency>
        <dependency>
            <groupId>com.alibaba</groupId>
            <artifactId>fastjson</artifactId>
            <version>1.2.5</version>
        </dependency>
<!--          简化实体类的 get set方法-->
        <dependency>
            <groupId>org.projectlombok</groupId>
            <artifactId>lombok</artifactId>
            <optional>true</optional>
        </dependency>



<!--       测试-->
        <dependency>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-starter-test</artifactId>
            <scope>test</scope>
            <exclusions>
                <exclusion>
                    <groupId>org.junit.vintage</groupId>
                    <artifactId>junit-vintage-engine</artifactId>
                </exclusion>
            </exclusions>
        </dependency>
        <dependency>
            <groupId>junit</groupId>
            <artifactId>junit</artifactId>
        </dependency>
    </dependencies>

    <build>
        <plugins>
            <plugin>
```

```
                <groupId>org.springframework.boot</groupId>
                <artifactId>spring-boot-maven-plugin</artifactId>
            </plugin>
            <plugin>
                <groupId>org.springframework.boot</groupId>
                <artifactId>spring-boot-maven-plugin</artifactId>
                <configuration>
                    <!-- 如果没有该项配置，devtools不会起作用，即应用不会restart -->
                    <fork>true</fork>
                </configuration>
            </plugin>
        </plugins>
    </build>
```

现在去配置**application.properties**，SpringBoot可以识别两种格式的配置文件，分别是yml文件与properties文件，可以将application.properties文件换成application.yml，application.properties默认放在：src/main/resource目录下，SpringBoot会自动加载

application.properties

配置端口号和内嵌Tomcat表单序列化size

```
#配置端口号 和 内嵌tomcat表单序列化size
debug=true
server.port=8081
server.tomcat.max-http-form-post-size=-1
```

配置本地Oracle数据库

```
#配置oracle驱动以及数据库用例
spring.datasource.driver-class-name=oracle.jdbc.driver.OracleDriver
spring.datasource.url=jdbc:oracle:thin:@localhost:1521/deptyyc
spring.datasource.username=YYC
spring.datasource.password=YYC
```

配置日志信息

```
#logging configuration
#格式化，只能输出日期和内容
logging.level.org.springframework.boot.autoconfigure=ERROR
logging.pattern.console="%d - %msg%n"
#配置日志输出位置
logging.file.path=D:/
#配置日志输出文件 ，指定文件名
logging.file.name=D:/test.log
logging.file.max-size=10MB
```

配置Redis

```
#redis
# Redis数据库索引（默认为0）
spring.redis.database=0
# Redis服务器地址
spring.redis.host=127.0.0.1
# Redis服务器连接端口
spring.redis.port=6379
```

```
# Redis服务器连接密码（默认为空）
spring.redis.password=
# 连接池最大连接数（使用负值表示没有限制）
spring.redis.pool.max-active=8
# 连接池最大阻塞等待时间（使用负值表示没有限制）
spring.redis.pool.max-wait=-1
# 连接池中的最大空闲连接
spring.redis.pool.max-idle=8
# 连接池中的最小空闲连接
spring.redis.pool.min-idle=0
# 连接超时时间（毫秒）
spring.redis.timeout=0
```

配置JPA

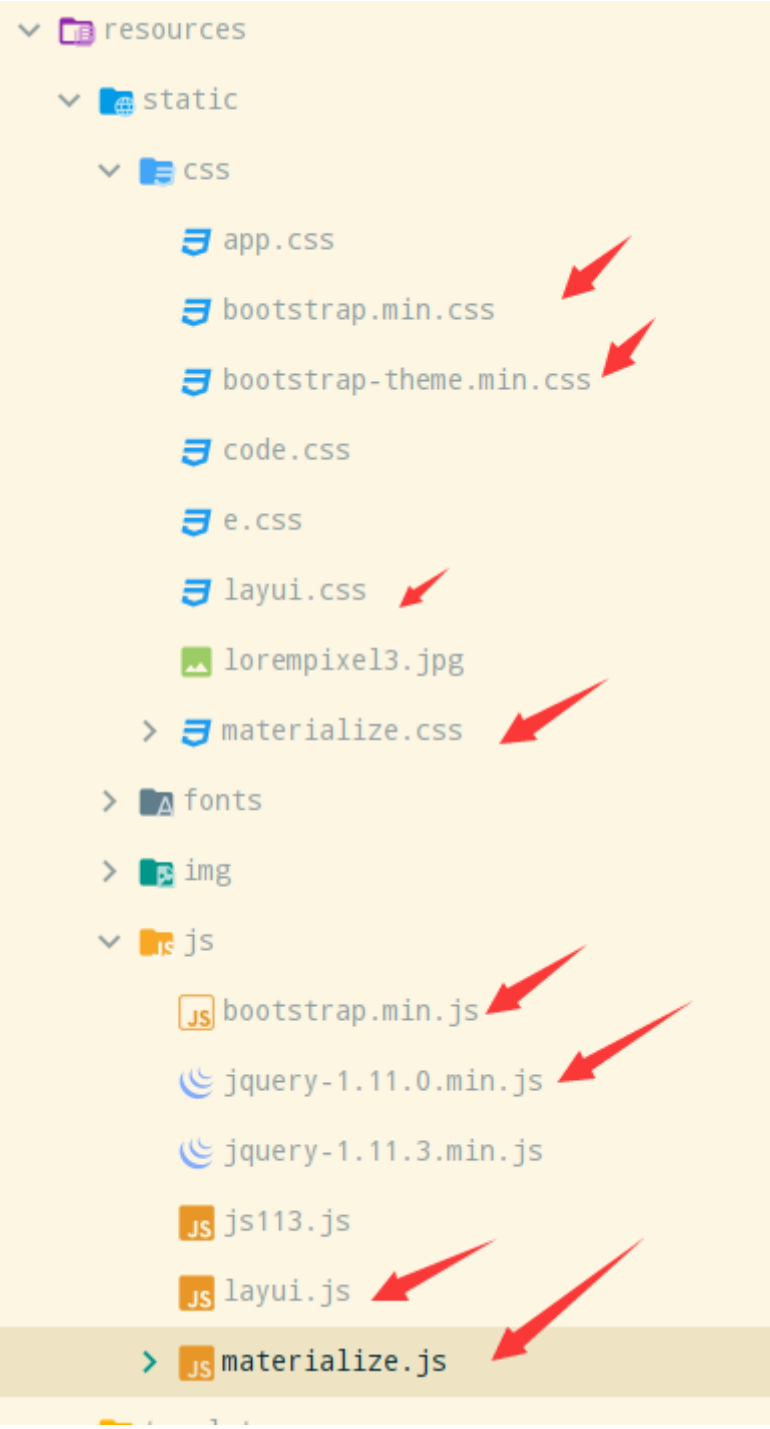
```
#配置Spring Data JPA
#数据库类型
spring.jpa.database=oracle
#是否展示sql语句
spring.jpa.show-sql=false
#项目启动时，create为清空数据库并重新建表，update为更新
spring.jpa.hibernate.ddl-auto=update
spring.jpa.hibernate.naming-strategy=org.hibernate.cfg.ImprovedNamingStrategy
```

配置JSP servlet

```
#配置  MVC JSP servlet
spring.mvc.view.prefix=/
spring.mvc.view.suffix=.jsp
server.servlet.jsp.init-parameters.development=true
```

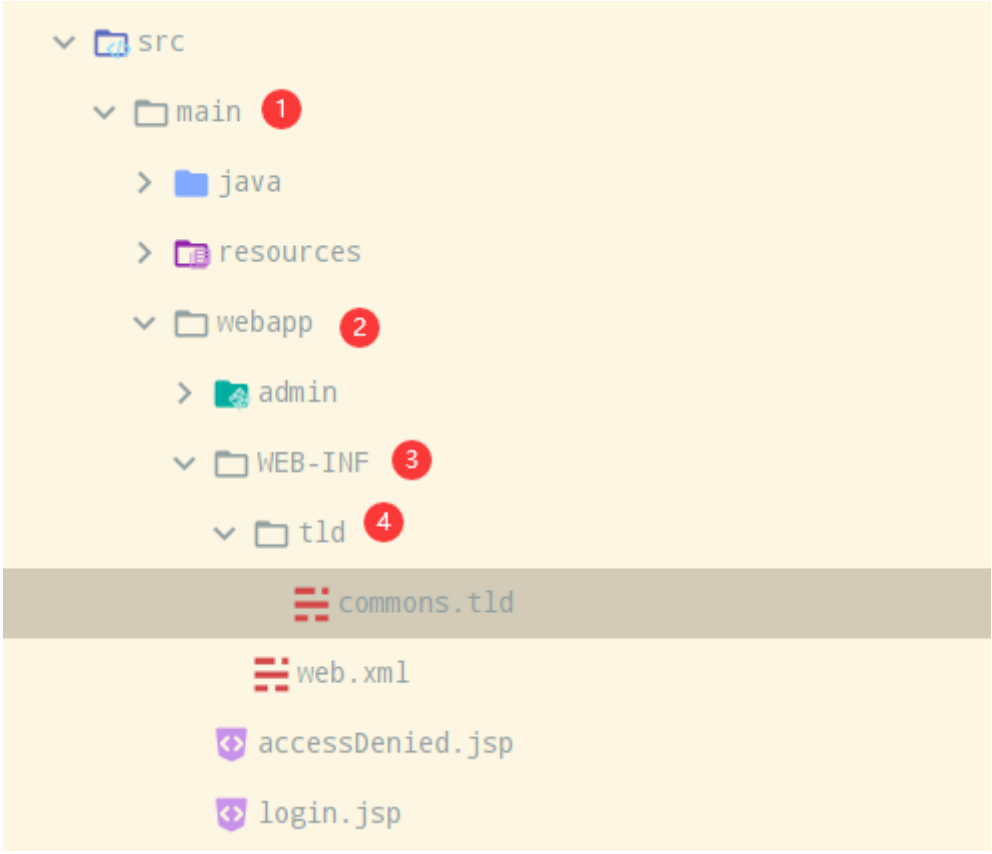
现在去引入静态资源JS,CSS,FONTS,IMG等，在resources下新建static文件夹放入各自的js，css，fonts，img文件夹即可

引入bootstrap，layui跟MaterializeUI跟对应的JQ即可



现在去配置分页标签commons.tld，NavigationTag，Page

在main目录下新建webapp文件夹，webapp目录下新建文件夹WEB-INF放置web.xml,WEB-INF目录下新建文件夹tld放置标签库配置文件commons.tld



web.xml

```
<web-app>
  <display-name>Archetype Created Web Application</display-name>
  <welcome-file-list>
        <welcome-file>login.jsp</welcome-file>
    </welcome-file-list>
    <taglib>
        <taglib-uri>http://navigationTag.com/common/</taglib-uri>
        <taglib-location>/WEB-INF/tld/commons.tld</taglib-location>
    </taglib>
</web-app>
```

commons.tld

```
<?xml version="1.0" encoding="UTF-8" ?>
<!DOCTYPE taglib
   PUBLIC "-//Sun Microsystems, Inc.//DTD JSP Tag Library 1.2//EN"
   "http://java.sun.com/dtd/web-jsptaglibrary_1_2.dtd">
<taglib>
    <!-- 指定标签库的版本号 -->
    <tlib-version>2.0</tlib-version>
    <!-- 指定JSP的版本号 -->
    <jsp-version>1.2</jsp-version>
    <!-- 指定标签库的名称 -->
    <short-name>common</short-name>
    <!-- 指定标签库的URI -->
    <uri>http://navigationTag.com/common/</uri>
    <!-- 指定标签库的显示名称 -->
    <display-name>Common Tag</display-name>
    <!-- 指定标签库的描述 -->
    <description>Common Tag library</description>
```

```
    <!-- 注册一个自定义标签 -->
    <tag>
        <!-- 指定注册的自定义标签名称 -->
        <name>page</name>
        <!-- 指定自定义标签的标签处理器类 -->
        <tag-class>com.example.demotest.util.NavigationTag</tag-class>
        <!-- 指定标签体类型 -->
        <body-content>JSP</body-content>
        <!-- 描述 -->
        <description>create navigation for paging</description>
        <!-- 指定标签中的属性 -->
        <attribute>
            <!-- 指定属性名称 -->
            <name>url</name>
            <!-- 该属性为true时表示其指定是属性为必须属性 -->
            <required>true</required>
            <!-- 该属性用于指定能不能使用表达式来动态指定数据，为true时表示可以 -->
            <rtexprvalue>true</rtexprvalue>
        </attribute>
        <attribute>
            <name>bean</name>
            <rtexprvalue>true</rtexprvalue>
        </attribute>
        <attribute>
            <name>number</name>
            <rtexprvalue>true</rtexprvalue>
        </attribute>
    </tag>
</taglib>
```

繁琐的配置文件搞定一半了接下来放入分页标签的工具类，新建工具类包utils放入PageData.java以及NavigationTag.java，至此分页标签配置完毕

PageData.java

```
import java.util.List;
public class PageData<T> {
    private int total;    // 总条数
    private int page;     // 当前页
    private int size;     // 每页数
    private List<T> rows; // 结果集
    public int getTotal() {
        return total;
    }
    public void setTotal(int total) {
        this.total = total;
    }
    public int getPage() {
        return page;
    }
    public void setPage(int page) {
        this.page = page;
    }
    public int getSize() {
        return size;
    }
```

```
    public void setSize(int size) {
        this.size = size;
    }
    public List<T> getRows() {
        return rows;
    }
    public void setRows(List<T> rows) {
        this.rows = rows;
    }
}
```

NavigationTag.java

```
import java.io.IOException;
import java.util.Map;
import javax.servlet.http.HttpServletRequest;
import javax.servlet.jsp.JspException;
import javax.servlet.jsp.JspWriter;
import javax.servlet.jsp.tagext.TagSupport;
/**
 * 显示格式：首页 上一页 1 2 3 4 5下一页 尾页
 */
public class NavigationTag extends TagSupport {
    static final long serialVersionUID = 2372405317744358833L;
    /**
     * request 中用于保存Page<E> 对象的变量名,默认为“page”
     */
    private String bean = "page";
    /**
     * 分页跳转的url地址,此属性必须
     */
    private String url = null;
    /**
     * 显示页码数量
     */
    private int number = 5;

    @Override
    public int doStartTag() throws JspException {

        System.out.println("doStartTag");
        JspWriter writer = pageContext.getOut();
        HttpServletRequest request =
                (HttpServletRequest) pageContext.getRequest();
        PageData page = (PageData) request.getAttribute(bean);
        if (page == null)
            return SKIP_BODY;
        url = resolveUrl(url, pageContext);
        try {
            // 计算总页数
            int pageCount = page.getTotal() / page.getSize();
            if (page.getTotal() % page.getSize() > 0) {
                pageCount++;
            }
            writer.print("<nav><ul class=\"pagination\">");
```

```
            //首页链接路径
            String homeUrl = append(url, "page", 1);
            //末页链接路径
            String backUrl = append(url, "page", pageCount);
            // 显示“上一页”按钮
            if (page.getPage() > 1) {
                String preUrl = append(url, "page", page.getPage() - 1);
                preUrl = append(preUrl, "rows", page.getSize());
                writer.print("<li><a href=\"" + homeUrl + "\">" + "首页</a>
</li>");
                writer.print("<li><a href=\"" + preUrl + "\">" + "上一页</a>
</li>");
            } else {
                writer.print("<li class=\"disabled\"><a href=\"#\">" + "首页 </a>
</li>");
                writer.print("<li class=\"disabled\"><a href=\"#\">" + "上一页
</a></li>");
            }
            // 显示当前页码的前2页码和后两页码
            // 若1 则 1 2 3 4 5, 若2 则 1 2 3 4 5, 若3 则1 2 3 4 5,
            // 若4 则 2 3 4 5 6 ,若10 则 8 9 10 11 12
            int indexPage =1;
            if(page.getPage() - 2 <=0){
                indexPage=1;
            }else if(pageCount-page.getPage() <=2){
                indexPage=pageCount-4;
            }else{
                indexPage= page.getPage() - 2;
            }
            for (int i= 1;i <= number && indexPage <= pageCount;indexPage++,i++)
{
                if (indexPage == page.getPage()) {
                    writer.print("<li class=\"active\"><a href=\"#\">" +
indexPage
                            +"<spanclass=\"sr-only\"></span></a></li>");
                    continue;
                }
                String pageUrl = append(url, "page", indexPage);
                pageUrl = append(pageUrl, "rows", page.getSize());
                writer.print("<li><a href=\"" + pageUrl + "\">" + indexPage + "
</a></li>");
            }
            // 显示“下一页”按钮
            if (page.getPage() < pageCount) {
                String nextUrl = append(url, "page", page.getPage() + 1);
                nextUrl = append(nextUrl, "rows", page.getSize());
                writer.print("<li><a href=\"" + nextUrl + "\">" + "下一页</a>
</li>");
                writer.print("<li><a href=\"" + backUrl + "\">" + "尾页</a>
</li>");
            } else {
                writer.print("<li class=\"disabled\"><a href=\"#\">" + "下一页
</a></li>");
                writer.print("<li class=\"disabled\"><a href=\"#\">" + "尾页</a>
</li>");
            }
            writer.print("</nav>");
        } catch (IOException e) {
```

```
            System.out.println("IOException");
            e.printStackTrace();
        }
        return SKIP_BODY;
    }

    private String append(String url, String key, int value) {
        return append(url, key, String.valueOf(value));
    }
    /**
     * 为url 参加参数对儿
     */
    private String append(String url, String key, String value) {
        if (url == null || url.trim().length() == 0) {
            return "";
        }
        if (url.indexOf("?") == -1) {
            url = url + "?" + key + "=" + value;
        } else {
            if (url.endsWith("?")) {
                url = url + key + "=" + value;
            } else {
                url = url + "&amp;" + key + "=" + value;
            }
        }
        return url;
    }
    /**
     * 为url 添加翻页请求参数
     */
    private String resolveUrl(String url,
                              javax.servlet.jsp.PageContext pageContext) throws
JspException {
        Map params = pageContext.getRequest().getParameterMap();
        for (Object key : params.keySet()) {
            if ("page".equals(key) || "rows".equals(key)){
                continue;
            }
            Object value = params.get(key);
            if (value == null){
                continue;
            }
            if (value.getClass().isArray()) {
                System.out.println("key.toString()"+key.toString());
                url = append(url, key.toString(), ((String[]) value)[0]);
            } else if (value instanceof String) {
                url = append(url, key.toString(), value.toString());
            }
        }
        return url;
    }
    public String getBean() {
        return bean;
    }
    public void setBean(String bean) {
        this.bean = bean;
    }
    public String getUrl() {
```

```
        return url;
    }
    public void setUrl(String url) {
        this.url = url;
    }
    public void setNumber(int number) {
        this.number = number;
    }
}
```

配置完分页该去配置Redis，在工具包下新建redis包放入RedisKeyUtil.java，对于配置文件要加@Component注释，@component （把普通pojo实例化到spring容器中，相当于配置文件中的`<bean id="" class=""/>`）

```
import ch.qos.logback.classic.LoggerContext;
import org.slf4j.Logger;
import org.slf4j.LoggerFactory;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.data.redis.core.RedisTemplate;
import org.springframework.data.redis.core.StringRedisTemplate;
import org.springframework.data.redis.core.ValueOperations;
import org.springframework.stereotype.Component;
import java.text.MessageFormat;
import java.util.Iterator;
import java.util.List;
import java.util.Set;
import java.util.concurrent.TimeUnit;

@Component
public class RedisKeyUtil {
    private final Logger log= LoggerFactory.getLogger(LoggerContext.class);

    /** 字符串缓存模板 */
    @Autowired
    private StringRedisTemplate stringRedisTemplate;
    /** 对象，集合缓存模板  */
    @Autowired
    private RedisTemplate<Object, Object> redisTemplate;

    public void reset(String key, Long seconds){
        stringRedisTemplate.expire(key, seconds, TimeUnit.SECONDS);
    }

    /**
     * 获取匹配的key
     * @param pattern
     * @return Set<String>
     */
    public Set<String> keys(String pattern){
        return stringRedisTemplate.keys(pattern);
    }

    /**
     * 批量删除keys
     * @param pattern
     */
```

```
    public void delKeys(String pattern){
        redisTemplate.delete(stringRedisTemplate.keys(pattern));
    }

    /**
     * 添加Set集合
     * @param key
     * @param set
     */
    public void addSet(String key ,Set<?> set){
        try{
            redisTemplate.opsForSet().add(key, set);
        }catch(Exception ex){
            ex.printStackTrace();
        }
    }

    /**
     * 获取Set集合

     * @return
     */
    public Set<?> getSet(String key){
        try{
            return redisTemplate.opsForSet().members(key);
        }catch(Exception ex){
            ex.printStackTrace();
        }
        return null ;
    }

    public String getString(String key) {
        String result = "";
        try {
            result = stringRedisTemplate.opsForValue().get(key);
        } catch (Exception e) {
            log.warn(spellString("getString {0}", key), e);
        }
        return result;
    }

    public  void delString(String key) {
        try {
            stringRedisTemplate.delete(key);
        } catch (Exception e) {
            log.warn(spellString("delString {0}", key),e);
        }
    }

    public void delAllString(String key) {
        if(key==null || "".equals(key)){
            return;
        }
        try {
            if (!key.endsWith("*")) {
                key += "*";
            }
            Set<String> keys = stringRedisTemplate.keys(key);
```

```
            Iterator<String> it = keys.iterator();
            while (it.hasNext()) {
                String singleKey = it.next();
                delString(singleKey);
            }
        } catch (Exception e) {
            log.warn(spellString("delString {0}", key), e);
        }
    }

    public void addObj(String key ,Object obj, Long seconds){
        try {
            //对象redis存储
            ValueOperations<Object, Object> objOps =
redisTemplate.opsForValue();
            if(seconds!=null){
                objOps.set(key, obj, seconds, TimeUnit.SECONDS);
            }else{
                objOps.set(key, obj);
            }
        } catch (Exception e) {
            log.warn(spellString("addObj {0}={1},{2}", key,obj,seconds),e);
        }
    }


    /**
     * @param  key
     * @return Object
     */
    public Object getObject(String key) {
        Object object = null;
        try {
            object = redisTemplate.opsForValue().get(key);
        } catch (Exception e) {
            log.warn(spellString("getObj {0}", key), e);
        }
        return object;
    }



    /**

     * @return Object
     */
    @SuppressWarnings({ "unchecked"})
    public <T> T getObj(String key, T t) {
        Object o = null;
        try {
            o = redisTemplate.opsForValue().get(key);
        } catch (Exception e) {
            log.warn(spellString("getObj {0}->{1}", key, t), e);
        }
        return o == null ? null : (T) o;
    }
```

```
public void expire(String key,long second){
    try {
        stringRedisTemplate.expire(key, second, TimeUnit.SECONDS);
    } catch (Exception e) {
        log.warn(spellString("expire {0}={1}", key, second),e);
    }
}

/**
 * @param key
 */
public void delObj(String key) {
    try {
        redisTemplate.delete(key);
    } catch (Exception e) {
        log.warn(spellString("delObj {0}", key),e);
    }
}



/**
 * 压栈
 *
 * @param key
 * @param value
 * @return
 */
public Long push(String key, String value) {
    Long result = 0l;
    try {
        result = stringRedisTemplate.opsForList().leftPush(key, value);
    } catch (Exception e) {
        log.warn(spellString("push {0}={1}", key,value),e);
    }
    return result;
}

/**
 * 出栈
 *
 * @param key
 * @return
 */
public String pop(String key) {
    String popResult = "";
    try {
        popResult = stringRedisTemplate.opsForList().leftPop(key);
    } catch (Exception e) {
        log.warn(spellString("pop {0}", key), e);
    }
    return popResult;
}

/**
 * 入队
 *
```

```
     * @param key
     * @param value
     * @return
     */
    public Long in(String key, String value) {
        Long inResult = 0l;
        try {
            inResult = stringRedisTemplate.opsForList().rightPush(key, value);
        } catch (Exception e) {
            log.warn(spellString("in {0}={1}", key, value), e);
        }
        return inResult;
    }

    /**
     * 出队
     *
     * @param key
     * @return
     */
    public String out(String key) {
        String outResult = "";
        try {
            outResult = stringRedisTemplate.opsForList().leftPop(key);
        } catch (Exception e) {
            log.warn(spellString("out {0}", key),e);
        }
        return outResult;
    }

    /**
     * 栈/队列长
     *
     * @param key
     * @return
     */
    public Long length(String key) {
        Long lengthResult = 0l;
        try {
            lengthResult = stringRedisTemplate.opsForList().size(key);
        } catch (Exception e) {
            log.warn(spellString("length {0}", key), e);
        }
        return lengthResult;
    }

    /**
     * 范围检索
     *
     * @param key
     * @param start
     * @param end
     * @return
     */
    public List<String> range(String key, int start, int end) {
        List<String> rangeResult = null;
        try {
```

```
            rangeResult = stringRedisTemplate.opsForList().range(key, start,
end);
        } catch (Exception e) {
            log.warn(spellString("range {0},{1}-{2}", key, start, end), e);
        }
        return rangeResult;
    }

    /**
     * 移除
     *
     * @param key
     * @param i
     * @param value
     */
    public void remove(String key, long i, String value) {
        try {
            stringRedisTemplate.opsForList().remove(key, i, value);
        } catch (Exception e) {
            log.warn(spellString("remove {0}={1},{2}", key,value,i),e);
        }
    }

    /**
     * 检索
     *
     * @param key
     * @param index
     * @return
     */
    public String index(String key, long index) {
        String indexResult = "";
        try {
            indexResult = stringRedisTemplate.opsForList().index(key, index);
        } catch (Exception e) {
            log.warn(spellString("index {0}", key), e);
        }
        return indexResult;
    }

    /**
     * 置值
     *
     * @param key
     * @param index
     * @param value
     */
    public void setObject(String key,  Object value,long index) {
        try {
            redisTemplate.opsForValue().set(key,value,index);
        } catch (Exception e) {
            log.warn(spellString("set {0}={1},{2}", key,value,index),e);
        }
    }


    public boolean setString(String key,String value ){
        try {
```

```
            stringRedisTemplate.opsForValue().set(key,value);
            return true;
        } catch (Exception e) {
            e.printStackTrace();
            return false;
        }
    }




    /**
     * 裁剪
     *
     * @param key
     * @param start
     * @param end
     */
    public void trim(String key, long start, int end) {
        try {
            stringRedisTemplate.opsForList().trim(key, start, end);
        } catch (Exception e) {
            log.warn(spellString("trim {0},{1}-{2}", key,start,end),e);
        }
    }

    /**
     * 方法说明: 原子性自增
     * @param key 自增的key
     * @param value 每次自增的值
     * @time: 2017年3月9日 下午4:28:21
     * @return: Long
     */
    public Long incr(String key, long value) {
        Long incrResult = 0L;
        try {
            incrResult = stringRedisTemplate.opsForValue().increment(key,
value);
        } catch (Exception e) {
            log.warn(spellString("incr {0}={1}", key, value), e);
        }
        return incrResult;
    }

    /**
     * 拼异常内容
     * @param errStr
     * @param arguments
     * @return
     */
    private String spellString(String errStr,Object ... arguments){
        return MessageFormat.format(errStr,arguments);
    }

}
```

由于在JPA中配置实体类ID自增映射Oracle数据库自增字段比较麻烦，所以采用雪花算法生成Long类型ID，但因为一般雪花算法生成的是18位ID，生成Long类型的长Id返回给前端精度丢失，JS 使用 IEEE 754 的双精度数表示数字，1 位符号，10 位指数，53 位底数。所以 JS 数字精度近似为 15.95 位 10 进制（`10 ** 15.95`）。因此需要对雪花算法进行调整生成15位，放置SystemClock.java和SequenceUtils.java

SystemClock

```
package com.example.demotest.util.snowflakeId;
import java.util.concurrent.Executors;
import java.util.concurrent.ScheduledExecutorService;
import java.util.concurrent.TimeUnit;
import java.util.concurrent.atomic.AtomicLong;

/**
 * 缓存时间戳解决System.currentTimeMillis()高并发下性能问题<br>
 *     问题根源分析: http://pzemtsov.github.io/2017/07/23/the-slow-
currenttimemillis.html
 **/
public class SystemClock {

    private final long period;
    private final AtomicLong now;

    private SystemClock(long period) {
        this.period = period;
        this.now = new AtomicLong(System.currentTimeMillis());
        scheduleClockUpdating();
    }

    /**
     * 尝试下枚举单例法
     */
    private enum SystemClockEnum {
        SYSTEM_CLOCK;
        private SystemClock systemClock;
        SystemClockEnum() {
            systemClock = new SystemClock(1);
        }
        public SystemClock getInstance() {
            return systemClock;
        }
    }

    /**
     * 获取单例对象
     * @return com.cmallshop.module.core.commons.util.sequence.SystemClock
     */
    private static SystemClock getInstance() {
        return SystemClockEnum.SYSTEM_CLOCK.getInstance();
    }

    /**
     * 获取当前毫秒时间戳
     * @return long
     */
    public static long now() {
```

```
        return getInstance().now.get();
    }

    /**
     * 起一个线程定时刷新时间戳
     */
    private void scheduleClockUpdating() {
        ScheduledExecutorService scheduler =
Executors.newSingleThreadScheduledExecutor(runnable -> {
            Thread thread = new Thread(runnable, "System Clock");
            thread.setDaemon(true);
            return thread;
        });
        scheduler.scheduleAtFixedRate(() -> now.set(System.currentTimeMillis()),
period, period, TimeUnit.MILLISECONDS);
    }

}
```

SequenceUtils

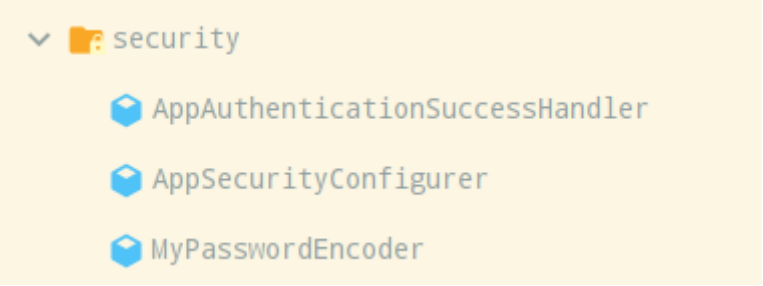
```
package com.example.demotest.util.snowflakeId;

import lombok.extern.slf4j.Slf4j;

import java.net.NetworkInterface;
import java.net.SocketException;
import java.util.Enumeration;

import static java.net.NetworkInterface.getNetworkInterfaces;

/**
 * 雪花算法分布式唯一ID生成器<br>
 * 每个机器号最高支持每秒65535个序列，当秒序列不足时启用备份机器号，若备份机器也不足时借用备份
机器下一秒可用序列<br>
 * 53 bits 趋势自增ID结构如下:
 *
 * |00000000|00011111|11111111|11111111|11111111|11111111|11111111|11111111|
 * |-----------|##########32bit 秒级时间戳##########|-----|-----------------|
 * |---------------------------------------5bit机器位|xxxxx|-----------------|
 * |-----------------------------------------16bit自增序列|xxxxxxxx|xxxxxxxx|
 **/
@Slf4j
public class SequenceUtils {

    /** 初始偏移时间戳 */
    private static final long OFFSET = 1546300800L;

    /** 机器id (0~15 保留 16~31作为备份机器) */
    private static long WORKER_ID = 0;
    /** 机器id所占位数 (5bit, 支持最大机器数 2^5 = 32)*/
    private static final long WORKER_ID_BITS = 5L;
    /** 自增序列所占位数 (16bit, 支持最大每秒生成 2^16 = 65536) */
    private static final long SEQUENCE_ID_BITS = 16L;
    /** 机器id偏移位数 */
    private static final long WORKER_SHIFT_BITS = SEQUENCE_ID_BITS;
    /** 自增序列偏移位数 */
```

```
    private static final long OFFSET_SHIFT_BITS = SEQUENCE_ID_BITS +
WORKER_ID_BITS;
    /** 机器标识最大值 (2^5 / 2 - 1 = 15) */
    private static final long WORKER_ID_MAX = ((1 << WORKER_ID_BITS) - 1) >> 1;
    /** 备份机器ID开始位置 (2^5 / 2 = 16) */
    private static final long BACK_WORKER_ID_BEGIN = (1 << WORKER_ID_BITS) >> 1;
    /** 自增序列最大值 (2^16 - 1 = 65535) */
    private static final long SEQUENCE_MAX = (1 << SEQUENCE_ID_BITS) - 1;
    /** 发生时间回拨时容忍的最大回拨时间 (秒) */
    private static final long BACK_TIME_MAX = 1L;

    /** 上次生成ID的时间戳 (秒) */
    private static long lastTimestamp = 0L;
    /** 当前秒内序列 (2^16)*/
    private static long sequence = 0L;
    /** 备份机器上次生成ID的时间戳 (秒) */
    private static long lastTimestampBak = 0L;
    /** 备份机器当前秒内序列 (2^16)*/
    private static long sequenceBak = 0L;

     {
        // 初始化机器ID
        // 伪代码: 由你的配置文件获取节点ID
        long workerId = this.getMachineNum();
        if (workerId < 0 || workerId > WORKER_ID_MAX) {
            throw new IllegalArgumentException(String.format("cmallshop.workerId
范围: 0 ~ %d 目前: %d", WORKER_ID_MAX, workerId));
        }
        WORKER_ID = workerId;
    }




    /** 私有构造函数禁止外部访问 */
    private SequenceUtils() {}

    /**
     * 获取自增序列
     * @return long
     */
    public static long nextId() {
        return nextId(SystemClock.now() / 1000);
    }

    /**
     * 主机器自增序列
     * @param timestamp 当前Unix时间戳
     * @return long
     */
    private static synchronized long nextId(long timestamp) {
        // 时钟回拨检查
        if (timestamp < lastTimestamp) {
            // 发生时钟回拨
            log.warn("时钟回拨, 启用备份机器ID: now: [{}] last: [{}]", timestamp,
lastTimestamp);
            return nextIdBackup(timestamp);
        }
```

```
        // 开始下一秒
        if (timestamp != lastTimestamp) {
            lastTimestamp = timestamp;
            sequence = 0L;
        }
        if (0L == (++sequence & SEQUENCE_MAX)) {
            // 秒内序列用尽
//            log.warn("秒内[{}]序列用尽, 启用备份机器ID序列", timestamp);
            sequence--;
            return nextIdBackup(timestamp);
        }

        return ((timestamp - OFFSET) << OFFSET_SHIFT_BITS) | (WORKER_ID <<
WORKER_SHIFT_BITS) | sequence;
    }

    /**
     * 备份机器自增序列
     * @param timestamp timestamp 当前Unix时间戳
     * @return long
     */
    private static long nextIdBackup(long timestamp) {
        if (timestamp < lastTimestampBak) {
            if (lastTimestampBak - SystemClock.now() / 1000 <= BACK_TIME_MAX) {
                timestamp = lastTimestampBak;
            } else {
                throw new RuntimeException(String.format("时钟回拨: now: [%d]
last: [%d]", timestamp, lastTimestampBak));
            }
        }

        if (timestamp != lastTimestampBak) {
            lastTimestampBak = timestamp;
            sequenceBak = 0L;
        }

        if (0L == (++sequenceBak & SEQUENCE_MAX)) {
            // 秒内序列用尽
//            logger.warn("秒内[{}]序列用尽, 备份机器ID借取下一秒序列", timestamp);
            return nextIdBackup(timestamp + 1);
        }

        return ((timestamp - OFFSET) << OFFSET_SHIFT_BITS) | ((WORKER_ID ^
BACK_WORKER_ID_BEGIN) << WORKER_SHIFT_BITS) | sequenceBak;
    }

    /**

     * 获取机器编码

     * @return

     */

    private  long getMachineNum(){

        long machinePiece;
```

```
        StringBuilder sb = new StringBuilder();
        Enumeration<NetworkInterface> e = null;
        try {
            e = getNetworkInterfaces();
        } catch (SocketException e1) {
            e1.printStackTrace();
        }
        while (e.hasMoreElements()) {
            NetworkInterface ni = e.nextElement();
            sb.append(ni.toString());
        }
        machinePiece = sb.toString().hashCode();
        return machinePiece;
    }
}
```

配置Security，引入Security修改一些参数即可



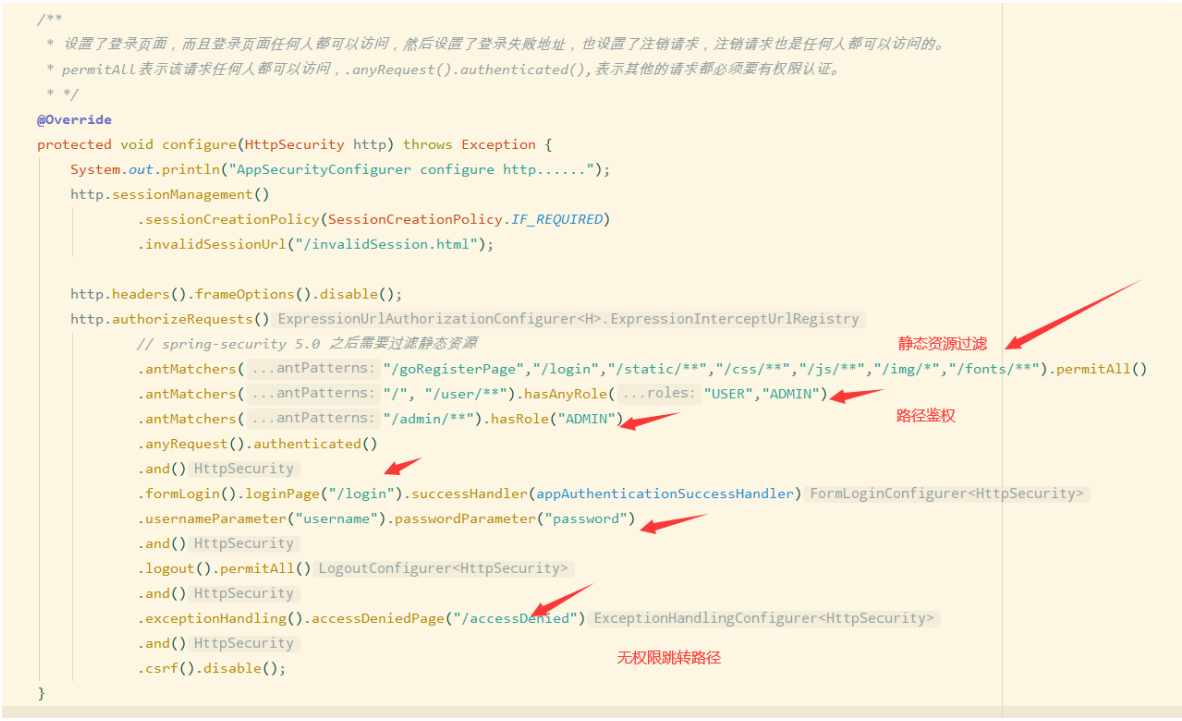
MyPasswordEncoder密码加密

```
import org.springframework.security.crypto.password.PasswordEncoder;
public class MyPasswordEncoder implements PasswordEncoder{

    @Override
    public String encode(CharSequence arg0) {
        return arg0.toString();
    }

    @Override
    public boolean matches(CharSequence arg0, String arg1) {
        return arg1.equals(arg0.toString());
    }

}
```

自定义Spring Security认证处理类

```
import com.example.demotest.Service.AuthService;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.context.annotation.Bean;
import org.springframework.context.annotation.Configuration;
import org.springframework.security.authentication.AuthenticationProvider;
import
org.springframework.security.authentication.dao.DaoAuthenticationProvider;
import
org.springframework.security.config.annotation.authentication.builders.Authentic
ationManagerBuilder;
import org.springframework.security.config.annotation.web.builders.HttpSecurity;
import
org.springframework.security.config.annotation.web.configuration.WebSecurityConf
igurerAdapter;
import org.springframework.security.config.http.SessionCreationPolicy;
import org.springframework.security.crypto.password.PasswordEncoder;

/**
 * 自定义Spring Security认证处理类的时候
 * 我们需要继承自WebSecurityConfigurerAdapter来完成，相关配置重写对应 方法即可。
 * */
@Configuration
public class AppSecurityConfigurer extends WebSecurityConfigurerAdapter{

    // 依赖注入用户服务类
    @Autowired
    private AuthService authService;

    // 依赖注入加密接口
    @Autowired
    private PasswordEncoder passwordEncoder;

    // 依赖注入用户认证接口
    @Autowired
    private AuthenticationProvider authenticationProvider;

    // 依赖注入认证处理成功类，验证用户成功后处理不同用户跳转到不同的页面
    @Autowired
    AppAuthenticationSuccessHandler appAuthenticationSuccessHandler;



    // DaoAuthenticationProvider是Spring Security提供AuthenticationProvider的实现
    @Bean
    public AuthenticationProvider authenticationProvider() {
        System.out.println("AuthenticationProvider authenticationProvider");
        // 创建DaoAuthenticationProvider对象
        DaoAuthenticationProvider provider = new DaoAuthenticationProvider();
        // 不要隐藏"用户未找到"的异常
        provider.setHideUserNotFoundExceptions(false);
        // 通过重写configure方法添加自定义的认证方式。
        provider.setUserDetailsService(authService);
        // 设置密码加密程序认证
        provider.setPasswordEncoder(passwordEncoder);
```

```
        return provider;
    }

    @Override
    protected void configure(AuthenticationManagerBuilder auth) throws Exception
{
        System.out.println("AppSecurityConfigurer configure auth......");
        // 设置认证方式。
        auth.authenticationProvider(authenticationProvider);

    }

    /**
     * 设置了登录页面，而且登录页面任何人都可以访问，然后设置了登录失败地址，也设置了注销请求，
注销请求也是任何人都可以访问的。
     * permitAll表示该请求任何人都可以访问，.anyRequest().authenticated(),表示其他的请
求都必须要有权限认证。
     * */
    @Override
    protected void configure(HttpSecurity http) throws Exception {
        System.out.println("AppSecurityConfigurer configure http......");
        http.sessionManagement()
                .sessionCreationPolicy(SessionCreationPolicy.IF_REQUIRED)
                .invalidSessionUrl("/invalidSession.html");

        http.headers().frameOptions().disable();
        http.authorizeRequests()
                // spring-security 5.0 之后需要过滤静态资源

.antMatchers("/goRegisterPage","/login","/static/**","/css/**","/js/**","/img/*"
,"/fonts/**").permitAll()// 过滤静态资源，所有人可以访问
                .antMatchers("/").hasAnyRole("USER","ADMIN")//配置ROLE有权访问的路
径
                .antMatchers("/admin/**").hasRole("ADMIN")
                .anyRequest().authenticated()
                .and()

.formLogin().loginPage("/login").successHandler(appAuthenticationSuccessHandler)
//配置登录页面访问的路径
                .usernameParameter("username").passwordParameter("password")  //
配置登录页面 所需用户名和密码
                .and()
                .logout().permitAll()
                .and()
                .exceptionHandling().accessDeniedPage("/accessDenied")
                .and()
                .csrf().disable();
    }

}
```



AppAuthenticationSuccessHandler 负责所有重定向事务

```
import java.io.IOException;
import java.util.ArrayList;
import java.util.Collection;
import java.util.List;
import javax.servlet.http.HttpServletRequest;
import javax.servlet.http.HttpServletResponse;
import org.springframework.security.core.Authentication;
import org.springframework.security.core.GrantedAuthority;
import org.springframework.security.web.DefaultRedirectStrategy;
import org.springframework.security.web.RedirectStrategy;
import
org.springframework.security.web.authentication.SimpleUrlAuthenticationSuccessHa
ndler;
import org.springframework.stereotype.Component;
@Component
public class AppAuthenticationSuccessHandler extends
SimpleUrlAuthenticationSuccessHandler{
    // Spring Security 通过RedirectStrategy对象负责所有重定向事务
    private RedirectStrategy redirectStrategy = new DefaultRedirectStrategy();

    /*
     * 重写handle方法，方法中通过RedirectStrategy对象重定向到指定的url
     * */
    @Override
    protected void handle(HttpServletRequest request, HttpServletResponse
response,
                          Authentication authentication)
            throws IOException {
        // 通过determineTargetUrl方法返回需要跳转的url
        String targetUrl = determineTargetUrl(authentication);
        // 重定向请求到指定的url
        redirectStrategy.sendRedirect(request, response, targetUrl);
    }
```

```
    /*
     * 从Authentication对象中提取角色提取当前登录用户的角色，并根据其角色返回适当的URL。
     */
    protected String determineTargetUrl(Authentication authentication) {
        String url = "";

        // 获取当前登录用户的角色权限集合
        Collection<? extends GrantedAuthority> authorities =
authentication.getAuthorities();

        List<String> roles = new ArrayList<String>();

        // 将角色名称添加到List集合
        for (GrantedAuthority a : authorities) {
            roles.add(a.getAuthority());
        }

        // 判断不同角色跳转到不同的url
        if (isUser(roles)) {
            url = "/user/indexR";
        } else if (isAdmin(roles)) {
            url = "/admin/indexA";
        }else {
            url = "/accessDenied";
        }
        System.out.println("url = " + url);
        return url;
    }

    private boolean isUser(List<String> roles) {
        if (roles.contains("ROLE_USER")) {
            return true;
        }
        return false;
    }

    private boolean isAdmin(List<String> roles) {
        if (roles.contains("ROLE_ADMIN")) {
            return true;
        }
        return false;
    }

    public void setRedirectStrategy(RedirectStrategy redirectStrategy) {
        this.redirectStrategy = redirectStrategy;
    }

    protected RedirectStrategy getRedirectStrategy() {
        return redirectStrategy;
    }
}
```

现在权限验证也弄完了，该回到系统主题了，使用Spring data jpa框架时需要先去构建实体类，配合权限验证需要role类，admin类，其次需要role和admin之间的多对多关系，还需要User类也就是员工类，由于使用了lombok,因此只需要显式的注释@Data来表明Setter() Getter()方法，而使用JPA生成表以及映射表时需要@Entity注明实体，@Table(name="tb_admin")注明表名，类需要implements Serializable，主键字段注明@Id

Role.java 角色表

```
@Data
@Entity
@Table(name="tb_role")
public class Role implements Serializable {

    private static final long serialVersionUID = 1L;

    @Id
    @Column(name="id")
    private Long id;  //主键id
    @Column(name="authority") //指定生成字段名称
    private String authority;//角色
    private String authorityDesc;//角色描述

    public Role() {
        super();
        // TODO Auto-generated constructor stub
    }

}
```

Admin.java 管理员表，需要配置与Role的多对多关系

```
@Data
@Entity
@Table(name="tb_admin")
public class Admin implements Serializable{

    private static final long serialVersionUID = 1L;
    @Id
    private Long id;
    private String username;
    private String password;

    @ManyToMany(cascade = {CascadeType.REFRESH},fetch = FetchType.EAGER)  //级联
    @JoinTable(name="tb_admin_role",   //多对多生成的表
            joinColumns={@JoinColumn(name="aid")},
            inverseJoinColumns={@JoinColumn(name="roleid")})
    private List<Role> roles;
}
```

User.java 职员表

```
@Data
@Entity
@JsonIgnoreProperties(value = { "hibernateLazyInitializer", "handler" })
@Table(name="tb_users")
public class Users implements Serializable{

    private static final long serialVersionUID = 1L;
    @Id
    private Long id;       //雪花id  用法 long id = SnowFlake.nextId();
    private String username; //员工姓名
    private String password; //密码
```

```
    private String sex;      //性别
    private Long eid;      //员工工号
    private String job;      //职位
    private Float basicSalary; //基本工资
    private Float welfarePoints;   //剩余积分
    private String phone;    //手机号
    private String idcard;   //身份证号
    @CreatedDate
    @JSONField(name = "joinTime",format = "yyyy-MM-dd")
    @DateTimeFormat(pattern = "yyyy-MM-dd")
    private Date joinTime;   //入职时间
//    @DateTimeFormat()
    @JSONField(name = "leaveTime",format = "yyyy-MM-dd")
    @DateTimeFormat(pattern = "yyyy-MM-dd")
    private Date leaveTime;   //离职时间
    private String address;  //地址
    private Boolean isWork;  //是否在职

    @ManyToOne( fetch=FetchType.EAGER,
            targetEntity=Role.class)
    @JoinColumn(name="rid",referencedColumnName="id")
    private Role role;

    @ManyToOne( fetch=FetchType.EAGER,
            targetEntity=Salary.class)
    @JoinColumn(name="sid",referencedColumnName="id")
    private Salary salary;
}
```

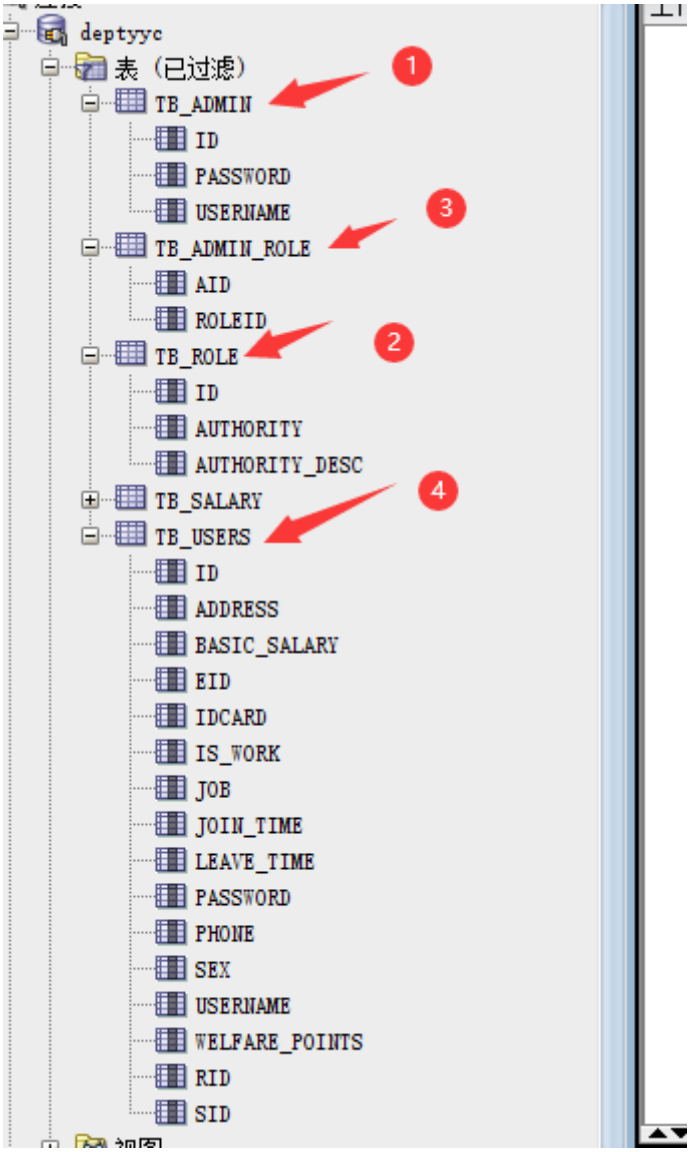
实体类完成，在数据库中建一个数据库，并把配置文件application.properties中JPA配置修改为

```
spring.jpa.hibernate.ddl-auto=create
```

直接启动项目，让JPA生成数据库表后，关闭项目，把配置文件application.properties中JPA配置修改为

```
spring.jpa.hibernate.ddl-auto=update
```

这样子首次启动项目时生成表，后面启动项目时不在重新生成表，ddl-auto=create意味着项目启动即清空表并删除原有表重新生成表



查看数据库中JPA已经生成了四个表，现在为TB_ROLE表，TB_ADMIN表，TB_ADMIN_ROLE表插入数据　TB_ROLE表中AUTHORITY字段一定要对应Security中配置的ROLE

```java
@Override
protected void configure(HttpSecurity http) throws Exception {
    System.out.println("AppSecurityConfigurer configure http......");
    http.sessionManagement()
            .sessionCreationPolicy(SessionCreationPolicy.IF_REQUIRED)
            .invalidSessionUrl("/invalidSession.html");

    http.headers().frameOptions().disable();
    http.authorizeRequests() ExpressionUrlAuthorizationConfigurer<H>.ExpressionInterceptUrlRegistry
            // spring-security 5.0 之后需要过滤静态资源
            .antMatchers( ...antPatterns: "/goRegisterPage","/login","/static/**","/css/**","/js/**","/img/*",'
            .antMatchers( ...antPatterns: "/", "/user/**").hasAnyRole( ...roles: "USER","ADMIN")
            .antMatchers( ...antPatterns: "/admin/**").hasRole("ADMIN")
            .anyRequest().authenticated()
        // 判断不同角色跳转到不同的url
        if (isUser(roles)) {
            url = "/user/indexR";
        } else if (isAdmin(roles)) {
            url = "/admin/indexA";
        }else {
            url = "/accessDenied";
        }
        System.out.println("url = " + url);
        return url;
    }

    private boolean isUser(List<String> roles) {
        if (roles.contains("ROLE_USER")) {
            return true;
        }
        return false;
    }

    private boolean isAdmin(List<String> roles) {
        if (roles.contains("ROLE_ADMIN")) {
            return true;
        }
        return false;
    }
```

```
Insert into YYC.TB_ADMIN (ID,PASSWORD,USERNAME) values
(1,'$2a$10$wy95RkpcCOGkLkGkN..Loej480aRBRHOKy7IG.BrXiqpINQ1IOAcW','1');
Insert into YYC.TB_ROLE (ID,AUTHORITY,AUTHORITY_DESC) values (1,'ROLE_ADMIN','管理员权限');
Insert into YYC.TB_ROLE (ID,AUTHORITY,AUTHORITY_DESC) values (2,'ROLE_USER','普通用户权限');
Insert into YYC.TB_ADMIN_ROLE (AID,ROLEID) values (1,1);
```

回到Spring boot项目，构建Repository层，Service层，Controller层，这里只对Users职员做详细介绍

UsersDao，注意这里只对3个逻辑复杂的查询方法做了原生查询，其他基本上按照符合JPA接口的命名规范写，方法名称规则既然是基于方法命名规则，那么肯定有一套规则约束方法的命名：

findBy（关键字）+ 属性名称（首字母大写）+ 查询条件（首字母大写），JPA会生成JPQL语言操作实体类进行SQL操作，添加，修改，删除默认调用提供的接口即可

以下面的表格的形式给出：

关键字	*方法命名*	*sql where字句*
And	findByNameAndPwd	where name= ? and pwd =?
Or	findByNameOrSex	where name= ? or sex=?
Is,Equals	findById,findByIdEquals	where id= ?
Between	findByIdBetween	where id between ? and ?
LessThan	findByIdLessThan	where id < ?
LessThanEquals	findByIdLessThanEquals	where id <= ?
GreaterThan	findByIdGreaterThan	where id > ?
GreaterThanEqual	findByAgeGreaterThanEqual	where age >= ?
After	findByIdAfter	where id > ?
Before	findByIdBefore	where id < ?
IsNull	findByNameIsNull	where name is null
isNotNull,NotNull	findByNameNotNull	where name is not null
Like	findByNameLike	where name like ?
NotLike	findByNameNotLike	where name not like ?
StartingWith	findByNameStartingWith	where name like '?%'
EndingWith	findByNameEndingWith	where name like '%?'
Containing	findByNameContaining	where name like '%?%'
OrderBy	findByIdOrderByXDesc	where id=? order by x desc
Not	findByNameNot	where name <> ?
In	findByIdIn(Collection<?> c)	where id in (?)
NotIn	findByIdNotIn(Collection<?> c)	where id not in (?)
TRUE	findByAaaTue	where aaa = true
FALSE	findByAaaFalse	where aaa = false
IgnoreCase	findByNameIgnoreCase	where UPPER(name)=UPPER(?)
top	findTop100	top 10/where ROWNUM <=10

```
import com.example.demotest.Entity.Users;
import org.springframework.data.jpa.repository.JpaRepository;
import org.springframework.data.jpa.repository.JpaSpecificationExecutor;
import org.springframework.data.jpa.repository.Query;
import java.util.List;
import java.util.Map;
import java.util.Optional;
import java.util.Set;
```

```
                                        //Users为实体类名称，Long为主键Id类型，
JpaSpecificationExecutor为分页查询
public interface UsersDao extends JpaRepository<Users,Long> ,
JpaSpecificationExecutor<Users> {
    /**
     * 登录鉴权使用
     * @param username
     * @return
     */
    Optional<Users> findByUsername(String username);

    /**
     * 分职位查询在职的员工数量 饼图
     * @param job
     * @param iswork
     * @return
     */
    Long countByJobAndIsWork(String job,Boolean iswork);

    /**
     * 查询在职员工工资分布情况 柱形图
     * @param iswork
     * @param down
     * @param up
     * @return
     */
    Long countByIsWorkAndBasicSalaryBetween(Boolean iswork,Float down,Float up);

    /**
     * 查询在职员工数量
     * @param isWork
     * @return
     */
    Long countByIsWork(Boolean isWork);

    /**
     * 添加新员工时查询最大的工号
     * @return
     */
    @Query("select  coalesce(max(u.eid),0)  from Users u ")
    Long getMaxEiD( );

    /**
     * 查询最近一个月入职的员工总数
     * @return
     */
    @Query(value = "select count(id) AS total from TB_USERS where
JOIN_TIME>systimestamp-interval'30'day",nativeQuery = true)
    Long countRecentlyJoinedWorker();
    /**
     * 查询最近一个月离职的员工总数
     * @return
     */
    @Query(value = "select count(id) AS total from TB_USERS where
LEAVE_TIME>systimestamp-interval'30'day",nativeQuery = true)
    Long countRecentlyLeaveWorker();

    /**
```

```
     * 查询今年十二个月离职和入职的同事分布情况   折线图
     * @return
     */
    @Query(value = "select t2.datevalue as timeDateMM, nvl(t1.count, 0) as
INScanCount ,nvl(t0.count, 0) as OutScanCount \n" +
            "  from (select count(*) as count, month_time\n" +
            "          from (select to_char(TB_USERS.LEAVE_TIME, 'MM') as
month_time\n" +
            "                  from TB_USERS)\n" +
            "         group by month_time\n" +
            "         order by month_time asc) t0,\n" +
            "         \n" +
            "          (select count(*) as count, month_time\n" +
            "          from (select to_char(TB_USERS.JOIN_TIME, 'MM') as
month_time\n" +
            "                  from TB_USERS)\n" +
            "         group by month_time\n" +
            "         order by month_time asc) t1,\n" +
            "         \n" +
            "       (select '' || lpad(level, 2, 0) datevalue\n" +
            "          from dual\n" +
            "        connect by level < 13) t2\n" +
            "        \n" +
            " where t0.month_time(+) = t2.datevalue AND t1.month_time(+) =
t2.datevalue\n" +
            " order by t2.datevalue\n",nativeQuery = true)
          List<Map<String, Object>> getJoinAndLeaveByMouth();

    /**
     * 查询 like姓名的员工
     * @param
     * @return
     */
    @Query(value = " SELECT USERNAME FROM TB_USERS where USERNAME LIKE '%'||?
1||'%' ",nativeQuery = true)
    Set<String> findUsernameByUsernameLike(String username);
}
```

那么我们该怎么去利用JPA做一个增删查改呢?

- **分页查询职员****
- 需求：查询条件（职员姓名（需模糊查询（可进行查询联想），职工号（equal精确查询），性别equal精确查询，职位equal精确查询，是否在职equal精确查询），若查询时带有查询条件参数则按照带查询条件进行查询，默认查询为分页查询所有职员，使用JpaSpecificationExecutor接口中Page findAll(@Nullable Specification var1, Pageable var2);方法即可

  后端实现分页查询

使用JpaSpecificationExecutor接口方法直接从service层开始写

```
                                    //Users为实体类名称，Long为主键Id类型，JpaSpecificationExecutor为分页查询
public interface UsersDao extends JpaRepository<Users,Long> , JpaSpecificationExecutor<Users> {
    /**
```

注明service层，引入userDao

首先判断查询条件是否为空，在判断 "是否在职条件"为空

```
//分页查询用户信息
@SuppressWarnings("serial")
public Page<Users> getUsersByPage( final Users user , int pageIndex , int
pageSize ) {
    // 指定排序参数对象：根据id，进行降序查询
    Sort sort = Sort.by(Sort.Direction.DESC, "id");
    // 分页查询用户信息，返回分页实体对象数据,过滤条件为员工编号、姓名、职位，性别，是否在职。
    // pages对象中包含了查询出来的数据信息，以及与分页相关的信息
    Page<Users>  pages= userDao.findAll(new Specification<Users>() {
        @Override
        public Predicate toPredicate(Root<Users> root, CriteriaQuery<?> query,
                                     CriteriaBuilder cb) {
            List<Predicate> predicates = new ArrayList<Predicate>();
            if(user!=null){
                if(user.getIsWork()==null){
                if(!StringUtils.isEmpty(user.getUsername())){
                    predicates.add(cb.like(root.<String> get("username"),
"%"+user.getUsername()+"%"));
                }
                if(user.getEid() != null){
                    predicates.add(cb.equal(root.<String> get("eid"),
user.getEid()));
                }
                if(!StringUtils.isEmpty(user.getSex())){
                    predicates.add(cb.equal(root.<String> get("sex"),
user.getSex()));
                }
                if(!StringUtils.isEmpty(user.getJob())){
                    predicates.add(cb.equal(root.<String> get("job"),
user.getJob()));
                }
                }
                else if (user.getIsWork()){
                    predicates.add(cb.equal(root.<String> get("isWork"),
user.getIsWork()));

                        if (!StringUtils.isEmpty(user.getUsername())) {
                            predicates.add(cb.like(root.<String>get("username"),
"%" + user.getUsername() + "%"));
                        }
                        if (user.getEid() != null) {
                            predicates.add(cb.equal(root.<String>get("eid"),
user.getEid()));
                        }
                        if (!StringUtils.isEmpty(user.getSex())) {
```

```
                            predicates.add(cb.equal(root.<String>get("sex"),
user.getSex()));
                        }
                        if (!StringUtils.isEmpty(user.getJob())) {
                            predicates.add(cb.equal(root.<String>get("job"),
user.getJob()));
                        }

                }else {
                    predicates.add(cb.equal(root.<String> get("isWork"),
user.getIsWork()));
                        if (user.getEid() != null) {
                            predicates.add(cb.equal(root.<String>get("eid"),
user.getEid()));
                        }
                        if (!StringUtils.isEmpty(user.getSex())) {
                            predicates.add(cb.equal(root.<String>get("sex"),
user.getSex()));
                        }
                        if (!StringUtils.isEmpty(user.getJob())) {
                            predicates.add(cb.equal(root.<String>get("job"),
user.getJob()));
                        }
                }
            }
            return query.where(predicates.toArray(new
Predicate[predicates.size()])).getRestriction();
        }
    },PageRequest.of(pageIndex-1, pageSize, sort));
    return pages;
};
```

控制层 @Controller注明为控制层，@RequestMapping注明url根路径，引入UsersService职员服务层，RedisKeyUtil 缓存key配置文件以及日志Logger

这里分页查询没有用到异步传值，直接设计method="post" ，Model返回信息，在JSP页面放入table中进行c:forEach循环，分页信息默认显示首页，每页十条数据

```
/**
 * 用户管理界面
 * @param page 分页数据
 * @param rows
 * @param user 查询条件
 * @param model 查询条件数据回显
 * @return
 */
```

```
@RequestMapping(value="/toUser.action")  //到管理员页面
public String toReaderA(@RequestParam(defaultValue="1")Integer page,
                        @RequestParam(defaultValue="10")Integer rows, Users
user,
                        Model model) {
    Page<Users> pageS =usersService.getUsersByPage(user,page, rows );
    List<Users> users = pageS.getContent();
    // 将分页查询出的结果数据进行分析，然后把数据存入到PageData对象中去保存起来响应给浏览器展
示
    PageData pageData = new PageData();
    pageData.setPage(pageS.getNumber()+1);
    pageData.setRows(users);
    pageData.setSize(pageS.getSize());
    pageData.setTotal((int)pageS.getTotalElements());
    model.addAttribute("username",user.getUsername());
    model.addAttribute("eid",user.getEid());
    model.addAttribute("page",pageData);
    log.info("测试分页 查询出Content"+pageS.getContent() +"测试model数据"+model);
    return "admin/user";
}
```

前端JSP页面设计

引入标签库（防止中文乱码，jstl库及分页）

```
<%@ page language="java"  import="java.util.*" contentType="text/html;
charset=UTF-8"
    pageEncoding="UTF-8"%>
 <%@ page trimDirectiveWhitespaces="true"%>
<%@ taglib prefix="c" uri="http://java.sun.com/jsp/jstl/core" %>
<%@ taglib prefix="navigationTag" uri="http://navigationTag.com/common/"%>
```

配置basePath

```
<%
String path = request.getContextPath();
String basePath =
request.getScheme()+"://"+request.getServerName()+":"+request.getServerPort()+pa
th+"/";
%>
```

静态资源引入（css，js）

```
<link rel="stylesheet" href="<%=basePath%>css/bootstrap.min.css">

    <link rel="stylesheet" href="<%=basePath%>css/materialize.css">
    <link href="https://fonts.googleapis.com/icon?family=Material+Icons"
rel="stylesheet">

   <script type="text/javascript" src="<%=basePath%>js/js113.js"></script>
   <script type="text/javascript" src="<%=basePath%>js/jquery-1.11.0.min.js">
</script>
    <script type="text/javascript" src="<%=basePath%>js/materialize.js">
</script>
    <script type="text/javascript" src="<%=basePath%>js/materialize.min.js">
</script>
   <script type="text/javascript" src="<%=basePath%>js/bootstrap.min.js">
</script>
   <script src="http://static.runoob.com/assets/jquery-validation-
1.14.0/lib/jquery.js"></script>
   <script src="http://static.runoob.com/assets/jquery-validation-
1.14.0/dist/jquery.validate.min.js"></script>
   <script src="http://static.runoob.com/assets/jquery-validation-
1.14.0/dist/localization/messages_zh.js"></script>
```

CSS设计 这里用到的CSS来源于Materialize-UI

```
<style type="text/css">
   .error{
      color:red;
   }
   .tp{
      font-size: 20px;
   }
    input::-webkit-input-placeholder{
        color:red;
    }
    input::-moz-placeholder{   /* Mozilla Firefox 19+ */
        color:red;
    }
    input:-moz-placeholder{    /* Mozilla Firefox 4 to 18 */
        color:red;
    }
    input:-ms-input-placeholder{  /* Internet Explorer 10-11 */
        color:red;
    }

    /* label color */
    .input-field label {
        color: #000;
    }
    /* label focus color */
    .input-field input[type=text]:focus + label {
        color: #000;
    }
    /* label underline focus color */
    .input-field input[type=text]:focus {
        border-bottom: 1px solid #000;
        box-shadow: 0 1px 0 0 #000;
```

```
    }
    /* valid color */
    .input-field input[type=text].valid {
        border-bottom: 1px solid #000;
        box-shadow: 0 1px 0 0 #000;
    }
    /* invalid color */
    .input-field input[type=text].invalid {
        border-bottom: 1px solid #000;
        box-shadow: 0 1px 0 0 #000;
    }
    /* icon prefix focus color */
    .input-field .prefix.active {
        color: #000;
    }


</style>
   <style type="text/css">
      .autoComplete {margin:8px;position:relative;float:left;}
      .autoComplete input {width:200px;height:25px;margin:0;padding:0;line-
height:25px;}
      .autoComplete ul {z-index:-12;padding:0px;margin:0px;border:1px #333
solid;width:200px;background:white;display:none;position:absolute;left:0;top:28p
x;*margin-left:9px;*margin-top:2px;margin-top:1px\0;}
      .autoComplete li {list-style:none;}
      .autoComplete li a {display:block;color:#000;text-
decoration:none;padding:1px 0 1px 5px;_width:97%;}
      .autoComplete li a:hover {color:#000;background:#ccc;border:none;}
   </style>
```

带有查询条件的分页查询，样式设计来源Materialize-UI

```
<form class="form-inline" method="post"
      action="<%=basePath%>user/toUser.action">
   <div class="form-group">
      <label for="username"><p class="tp" style="color: #0C0C0C"></p></label>
         <div class="autoComplete" style="z-index:19">
            <input type="text" class="form-control" placeholder="姓名:"
id="username" value="${username}" name="username" >
            <ul><li></li></ul>
         </div>
   </div>
   <div class="form-group">
      <label for="eid"><p class="tp" style="color: #0C0C0C">工号:</p></label>
      <input type="text" class="form-control" id="eid" value="${eid}" name="eid"
>
   </div>
                <div class="form-group">
      <p>
         <input name="sex" value="女" type="radio" id="test1"  />
         <label for="test1">女士</label>
      </p>
      <p>
         <input name="sex" value="男" type="radio" id="test2" />
         <label for="test2" >男士</label>
      </p>
```

```
   </div>
       
   <div class="form-group">
      <p>
         <input name="isWork" value="true" type="radio" id="test3"  />
         <label for="test3">在职</label>
      </p>
      <p>
         <input name="isWork" value="false" type="radio" id="test4" />
         <label for="test4" >离职</label>
      </p>
   </div>
       
               <div class="form-group">
      <label  for="job"><p class="tp" style="color: #0C0C0C">Job list</p>
</label>
                        <select class="browser-default" name="job" id="job">
                            <option value="" disabled selected>Choose your
Job</option>
                            <option value ="开发工程师">开发工程师</option>
                            <option value ="实施工程师">实施工程师</option>
                            <option value="DBA">DBA</option>
                            <option value="产品经理">产品经理</option>
                            <option value="项目经理">项目经理</option>
                            <option value="HR">HR</option>
                        </select>
                </div>
   <button class="btn waves-effect waves-light green" type="submit"
name="action">查询
      <i class="material-icons right">send</i>
   </button>
</form>
```

分页显示职员信息table,table样式用的Bootstrap，但重新用Materialize-UI进行修饰，加上了图标以及按钮样式， 标签定义表格的表头，预先定义职员信息描述， 使用c:forEach 循环输出model里的数据

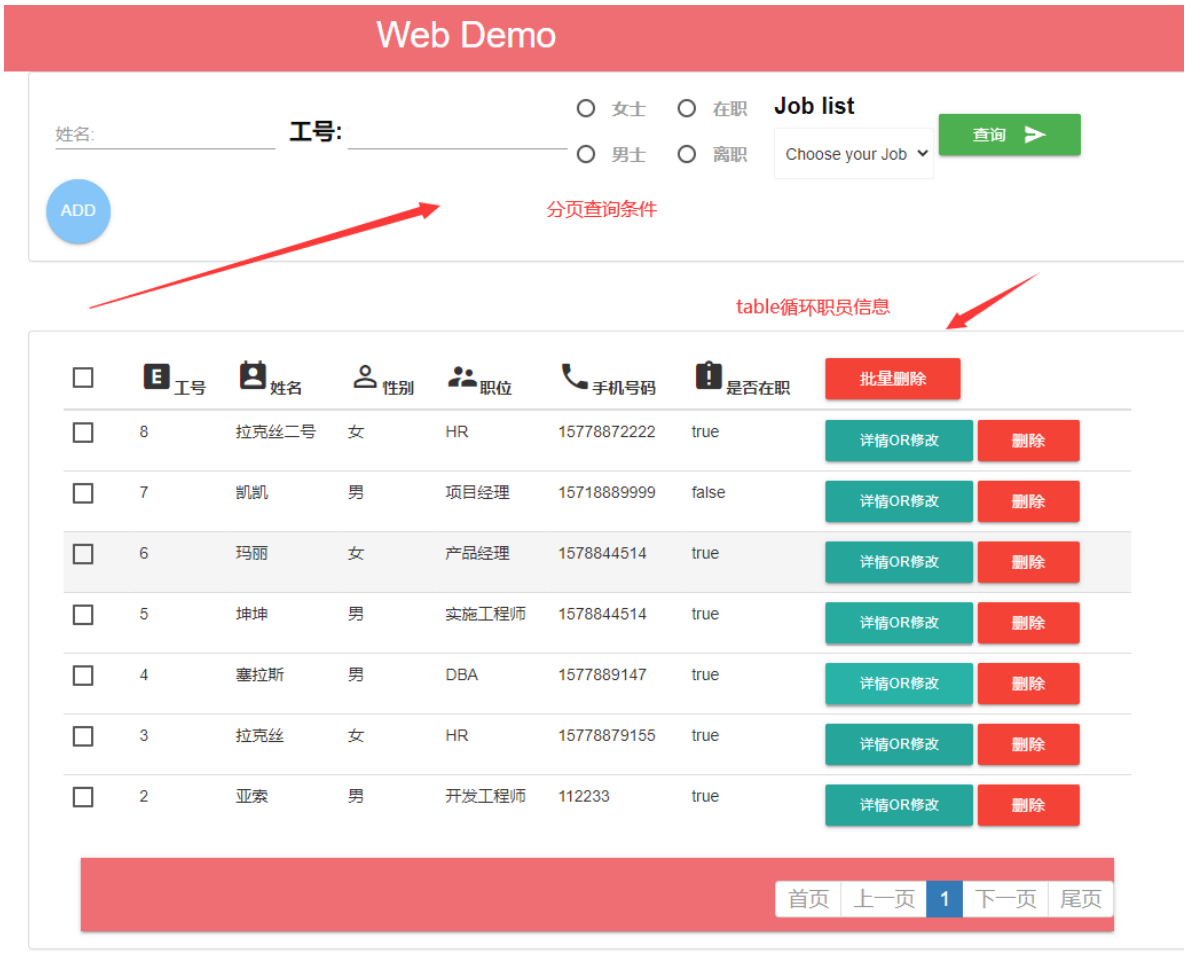
```
    <table class="table  table-hover">
      <thead>
         <tr>
            <th><input type="checkbox" class="i-checks" name="test5" id="all" >
               <label for="all"></label></th>
            <th><i class="small material-icons">explicit</i>工号</th>
            <th><i class="small material-icons">perm_contact_calendar</i>姓名
</th>
            <th><i class="small material-icons">perm_identity</i>性别</th>
            <th><i class="small material-icons">supervisor_account</i>职位</th>
            <th><i class="small material-icons">phone</i>手机号码</th>
            <th><i class="small material-icons">assignment_late</i>是否在职</th>
            <th><a href="#" class="btn waves-effect waves-light red"
onclick="deleteAll()">批量删除</a></th>
         </tr>
      </thead>
      <tbody id="questionlist">

         <c:forEach var="user" items="${page.rows}" varStatus="status" >
            <tr class="aa" draggable="true">
               <td>
```

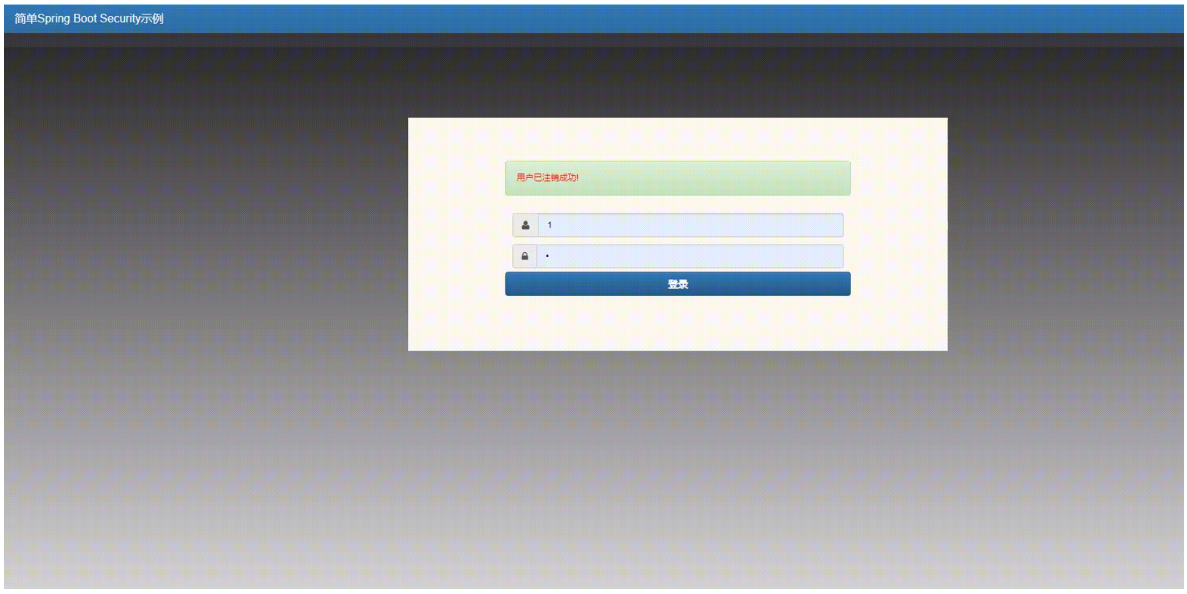
```
                  <input type="checkbox" class="i-checks" name="idone"
id="idone" value="${user.id}" >
                  <label for="idone"></label>
               </td>
               <td>
                  <c:out value="${user.eid }"/>
               </td>
               <td>
                  <c:out value="${user.username }"/>
               </td>
               <td>
                  <c:out value="${user.sex }"/>
               </td>
               <td>
                  <c:out value="${user.job }"/>
               </td>
               <td>
                  <c:out value="${user.phone }"/>
               </td>
               <td>
                  <c:out value="${user.isWork }"/>
               </td>

               <td>
                  <a href="#" class="btn btn-primary btn-xs" data-toggle="modal"
data-target="#customerEditDialog" onclick= "editUser(${user.id})">详情or修改</a>
                  <a href="#" class="btn waves-effect waves-light red"
onclick="deleteUser(${user.id})">删除</a>

               </td>
            </tr>
         </c:forEach>
      </tbody>
   </table>
   <div class="col-md-12 text-right">
      <navigationTag:page url="${pageContext.request.contextPath
}/user/toUser.action" />
   </div>
</div>
```

PageData分页标签使用：

```
<div class="col-md-12 text-right">
   <navigationTag:page url="${pageContext.request.contextPath
}/user/toUser.action" />
</div>
```

最终页面效果为：





- **添加职员**
- 需求：添加职员，ID为雪花生成，入职时间为当前时间，在职情况为TRUE
- 解决方法：职员信息在前端输入完成后通过AJAX异步提交到后端，controller层先判断user参数是否为空，不为空时直接调用Service层添加方法,ID，入职时间，在职情况直接在Service层处理

前端使用Bootstrap模态框生成添加职员模态框 target="#myModal" 为模态框ID

```
<form class="form-inline"  onsubmit="return false">
                <a class="btn-floating btn-large waves-effect waves-light blue"
type="button"  data-toggle="modal" data-target="#myModal">ADD<i class="material-
icons">add</i></a>
</form>
```

id="myModal" 对应 target="#myModal" class="modal fade bs-example-modal-lg" lg 样式注明为large巨大模态框

输入框带上id为jq获取输出框值，placeholder为输入框空值时提示 class="validate"为Materialize-UI样式 required注明该字段需要经过JQ validate校验

姓名 username

```
!-- 模态框开始（Modal） -->

<div class="modal fade bs-example-modal-lg" id="myModal"  style="height:fit-
content" tabindex="-1" role="dialog" aria-labelledby="myLargeModalLabel">
        <div class="modal-dialog modal-lg">
            <div class='yellow'>
            <button type="button" class="close" data-dismiss="modal" aria-
hidden="true">
            </button>
            <h4 class="modal-title" id="myModalLabel"  align="center">NEW WORKER
            </h4>
         </div>

            <div class="row">
                <form id="validateAdd" class="col s12" >
                    <div class="row">
                        <div class=".input-field col s6">
                         <label for="add_username">Name: </label>
                               <i class="material-icons prefix"></i>
                               <input id="add_username" type="text" placeholder="姓
名 username" class="validate" required>
                           </div>
                           <div class=".input-field col s6">
                         <label for="add_phone">tel: </label>
                               <i class="material-icons prefix"></i>
                               <input id="add_phone" type="tel" placeholder="电话
tel"  class="validate" required>

                           </div>
                    </div>
                    <div class="row">
                        <div class=".input-field col s2">
                         <label for="add_sex">性别选择 </label>
                         <select class="browser-default" id="add_sex" required>
                            <option value="" disabled selected>Choose sex</option>
                            <option value="男">小哥哥</option>
                            <option value="女">小姐姐</option>
                         </select>
                            </div>
                  <div class=".input-field col s4">
                               <label  for="add_job">职位 Choose</label>
```

```
                    <select class="browser-default" id="add_job" required>
                       <option value="" disabled selected>Choose Job</option>
                       <option value ="开发工程师">开发工程师</option>
                       <option value ="实施工程师">实施工程师</option>
                       <option value="DBA">DBA</option>
                       <option value="产品经理">产品经理</option>
                              <option value="项目经理">项目经理</option>
                       <option value="HR">HR</option>
                    </select>
                 </div>
                       <div class="input-field col s2">
                           <label  for="add_basicSalary">基本工资:</label>
                           <input id="add_basicSalary" type="text"
placeholder="工资 " class="validate" >
                       </div>
              </div>
                   <div class="row">
                       <div class="input-field col s6">
                        <label  for="add_idcard">身份证号码:</label>
                              <input id="add_idcard" type="text" placeholder="身份
证号码 idcard" class="validate" >

                       </div>
                       <div class="input-field col s6">
                        <label  for="add_address">地址:</label>
                              <input id="add_address" type="text" placeholder="地址
address" class="validate" >

                       </div>
                    </div>
                    <button  type="reset" class="btn btn-danger btn-xs">重置
</button>
                </form>
            </div>
         <div class="card-panel">
            <h5>Primary Buttons</h5>
            <button id="buttonAdd" class="btn waves-effect waves-light red"
onclick="addUser()">确认<i class="material-icons right">send</i></button>
                <button type="button" class="btn waves-effect waves-light yellow
" data-dismiss="modal">关闭<i class="material-icons right">cancel</i></button>
<%--            <button class="btn waves-effect waves-light red disabled" data-
dismiss="modal" >Cancel<i class="material-icons right">cancel</i></button>--%>
         </div>
      </div>
   </div>
</div>
<%--添加模态框结束--%>
```

添加职员 JS代码，首先校验字段空值和是否符合对应规则，校验通过后使用AJAX异步 post方法推送数据JSON格式数据

```
function addUser(){
    //form表单校验
   let flag = $('#validateAdd').valid();
   if(!flag) return;
   var username = $('#add_username').val();
   var sex = $('#add_sex').val();
```

```
   var job = $('#add_job').val();
   var basicSalary = $('#add_basicSalary').val();
   var phone = $('#add_phone').val();
   var idcard = $('#add_idcard').val();
   var address = $('#add_address').val();
       /*
       正则检验
        */
   var regPhone = /(^1(3|4|5|6|7|8|9)\d{9}$)/;
   if (!regPhone.test(phone)) {
      layer.msg('手机号码,请输入正确的数值，13/14/15/16/17/18/19开头的号码', {icon: 2,
time: 3000});
      return ;
   };
   var regIdcard = /(^\d{15}$)|(^\d{18}$)|(^\d{17}(\d|X|x)$)/;
   if (!regIdcard.test(idcard)) {
      layer.msg('身份证输入错误,请输入正确的数值', {icon: 2, time: 3000});
      return ;
   };
       var str = address.replace(/(^\s*)|(\s*$)/g, '');//去除空格;
       if (str == '' || str == undefined || str == null) {
           layer.msg('请输入地址，前中后不要包含空格', {icon: 2, time: 3000});
           return ;
       }
   var regBasicSalary = /(^[1-9]([0-9]+)?(\.[0-9]{1,2})?$)|(^(0){1}$)|(^[0-9]\.
[0-9]([0-9])?$)/;
   if (!regBasicSalary.test(basicSalary)) {
      layer.msg('工资输入错误,请输入正确的数值，例如正确：588.00 or 588 错误：558a or
adawd', {icon: 2, time: 3000});
      return ;
   };


$.ajax({
url : "<%=basePath%>user/add.action",
type : "post",
data :JSON.stringify({username: username,
   sex: sex,
   job: job,
   basicSalary: basicSalary,
   phone: phone,
   idcard: idcard,
   address: address}),
// 定义发送请求的数据格式为JSON字符串
contentType : "application/json;charset=UTF-8",
//定义回调响应的数据格式为JSON字符串,该属性可以省略
dataType : "json",
//成功响应的结果
success : function(data){
   if (data.code === 200) {
      layer.msg(data.msg, {icon: 1, time: 1000},function (index){
         window.location.reload();
         layer.close();
      });
   } else {
      layer.msg(data.msg, {icon: 2, time: 3000});
   }
}
```

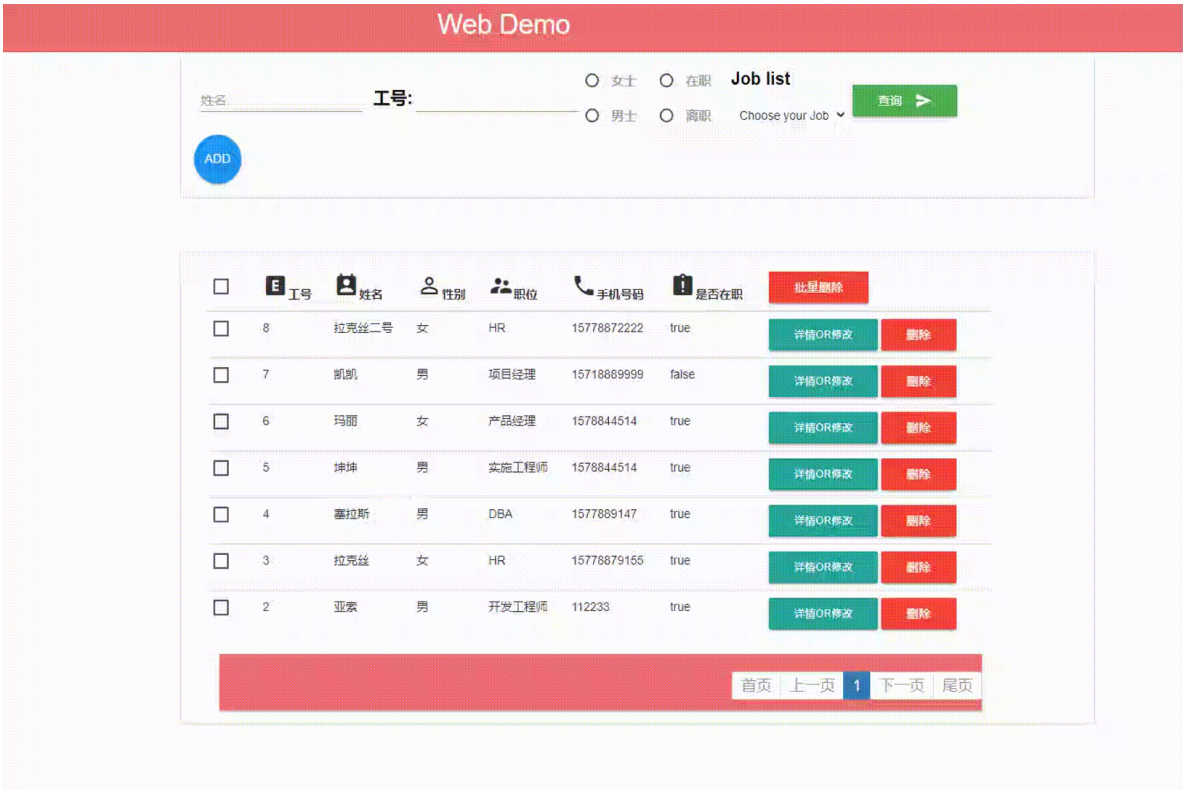
```
})
};
```

职员控制层，校验空指针

```
/**
 *   添加用户  AJAX
 * @param users 用户表单数据
 * @return
 */
@ResponseBody
@PostMapping(value = "/add.action")
    public ResponseEntity<?> addUser(@RequestBody Users users){
    Result result = new Result();
    if(Objects.isNull(users)){
        result.setCode(500);
        result.setMsg("FALSE");
        log.error("添加失败,返回值为"+result);
        return ResponseEntity.ok(result);
    }
        result.setCode(200);
        result.setMsg("OK");
    usersService.saveUser(users);
    log.info("添加成功"+users);
    return ResponseEntity.ok(result);
}
```

职员服务层

```
/**
 * 添加员工 需要事务支持
 * @param user
 */
@Transactional
public void   saveUser(Users user) {
    user.setEid(userDao.getMaxEiD()+1);
    user.setId(SequenceUtils.nextId()); //雪花算法ID生成

user.setPassword("$2a$10$36A/etwTPl2PscyArcEpzeAyvhC3cd1IJZYMXv27jIp67j0BOOpJa")
;
    user.setJoinTime(new Date());
    user.setIsWork(Boolean.TRUE);
    userDao.save(user);
};
```



- **详细查看职员**
- 需求：通过ID查询用户
- 解决方法：AJAX异步提交ID到后端，controller层先判断ID参数是否为空，不为空时直接调用Service层查询方法

  前端 生成详情模态框

  - **修改职员**
  - 需求：通过ID修改用户
  - 解决方法：AJAX异步提交ID到后端，controller层先判断ID参数是否为空，不为空时直接调用Service层查询方法，查询得到职员信息AJAX后通过JQ设置前端职员修改模态框信息为查询到的职员信息,修改完成后通过AJAX将表单序列化提交到后端进行处理，controller层先判断表单是否为空，不为空时直接调用Service层修改方法

```
<a href="#" class="btn btn-primary btn-xs" data-toggle="modal" data-
target="#customerEditDialog" onclick= "editUser(${user.id})">详情or修改</a>
```

```
<div class="modal fade bs-example-modal-lg" id="customerEditDialog"
tabindex="-1" role="dialog" aria-labelledby="myLargeModalLabel">
   <div class="modal-dialog modal-lg">
      <div class='red'>
         <button type="button" class="close" data-dismiss="modal" aria-
hidden="true">
         </button>
         <h4 class="modal-title" id="myModalLabel1"  align="center">ALTER
WORKER MESSAGE
         </h4>
      </div>
```

```
      <div class="row">
         <form class="col s12" id="edit_user_form">
            <input type="hidden" id="edit_id" name="id"/>
            <input type="hidden" id="edit_password" name="password"/>
            <input type="hidden" id="edit_eid" name="eid"/>
            <input type="hidden" id="edit_welfarePoints"
name="welfarePoints"/>
            <input type="hidden" id="edit_joinTime" name="joinTime"/>
            <input type="hidden" id="edit_leaveTime" name="leaveTime"/>
            <div class="row">
               <div class=".input-field col s6">
                  <label for="edit_username">Name: </label>
                  <i class="material-icons prefix"></i>
                  <input id="edit_username" type="text" placeholder="姓名
username"  name="username" class="validate" required>
               </div>
               <div class=".input-field col s6">
                  <label for="edit_phone">tel: </label>
                  <i class="material-icons prefix"></i>
                  <input id="edit_phone" type="tel" placeholder="电话 tel"
name="phone" class="validate" required>

               </div>
            </div>
            <div class="row">
               <div class=".input-field col s6"><p>Sex: </p>
                  <p>
                     <input name="sex" value="女" type="radio" id="sexW"
required/>
                     <label for="sexW">女士</label>
                  </p>
                  <p>
                     <input name="sex" value="男" type="radio" id="sexM" />
                     <label for="sexM">男士</label>
                  </p>
               </div>
               <div class=".input-field col s6"><p>是否在职: </p>
                  <p>
                     <input name="isWork" value="true" type="radio"
id="workT" required/>
                     <label for="workT">在职</label>
                  </p>
                  <p>
                     <input name="isWork" value="false" type="radio"
id="workF" />
                     <label for="workF">离职</label>
                  </p>
               </div>
            </div>

            <div class="row">
               <div class=".input-field col s2">
                  <label  for="edit_job">Job list</label>
                  <select class="browser-default" id="edit_job" name="job"
required>
                     <option value="" disabled selected>Choose your
Job</option>
```

```
                        <option value ="开发工程师">开发工程师</option>
                        <option value ="实施工程师">实施工程师</option>
                        <option value="DBA">DBA</option>
                        <option value="产品经理">产品经理</option>
                        <option value="项目经理">项目经理</option>
                        <option value="HR">HR</option>
                     </select>
                  </div>
                  <div class=".input-field col s2">
                     <label  for="edit_basicSalary">基本工资:</label>
                     <input id="edit_basicSalary" name="basicSalary"
type="text" placeholder="工资" class="validate">
                  </div>
               </div>
               <div class="row">
                  <div class=".input-field col s3">
                     <label  for="edit_idCard">身份证号码:</label>
                     <input id="edit_idCard" name="idcard" type="text"
placeholder="身份证号码 idcard" class="validate" >

                  </div>
                  <div class=".input-field col s6">
                     <label  for="edit_address">地址:</label>
                     <input id="edit_address" name="address" type="text"
placeholder="地址 address" class="validate">

                  </div>
               </div>


               <button  type="reset" class="btn btn-danger btn-xs">重置
</button>
            </form>
         </div>
         <div class="card-panel">
            <h5>Primary Buttons</h5>
            <button class="btn waves-effect waves-light red"
onclick="updateUser()">修改<i class="material-icons right">send</i></button>
            <button type="button" class="btn waves-effect waves-light yellow "
data-dismiss="modal">关闭<i class="material-icons right">cancel</i></button>

         </div>
      </div>
   </div>
```

```
function editUser(id) {
   $.ajax({
      type:"get",
      url:"<%=basePath%>user/getUserById.action",
      data:{"id":id},
      success:function(data) {
         $("#edit_id").val(data.id);
         $("#edit_username").val(data.username);
         $("#edit_password").val(data.password);
         // $("#edit_sex").val(data.sex);
         $("#edit_eid").val(data.eid);
         $("#edit_job").val(data.job);
```

```
          $("#edit_basicSalary").val(data.basicSalary);
          $("#edit_welfarePoints").val(data.welfarePoints);
          $("#edit_phone").val(data.phone);
          $("#edit_idCard").val(data.idcard);
          $("#edit_joinTime").val(data.joinTime);
          $("#edit_leaveTime").val(data.leaveTime);
          $("#edit_address").val(data.address);


          if (data.sex===("女")) {
             $("input[id=sexW][value='女']").attr("checked",true);//value=34
的radio被选中
          } else {
             $("input[id=sexM][value='男']").attr("checked",true);//value=34
的radio被选中
          }
          if (data.isWork) {
             $("input[id=workT]
[value='true']").attr("checked",true);//value=34的radio被选中
          } else {
             $("input[id=workF]
[value='false']").attr("checked",true);//value=34的radio被选中
          }

      }
   });
};

function updateUser() {
       let flag = $('#edit_user_form').valid();
       if(!flag) return;
       var basicSalary = $('#edit_basicSalary').val();
       var phone = $('#edit_phone').val();
       var idcard = $('#edit_idCard').val();
       var address = $('#edit_address').val();
       /*
       正则检验
        */
       var regPhone = /(^1(3|4|5|6|7|8|9)\d{9}$)/;
       if (!regPhone.test(phone)) {
           layer.msg('手机号码,请输入正确的数值，13/14/15/16/17/18/19开头的号码',
{icon: 2, time: 3000});
           return ;
       };
       var regIdcard = /(^\d{15}$)|(^\d{18}$)|(^\d{17}(\d|X|x)$)/;
       if (!regIdcard.test(idcard)) {
           layer.msg('身份证输入错误,请输入正确的数值', {icon: 2, time: 3000});
           return ;
       };
       var str = address.replace(/(^\s*)|(\s*$)/g, '');//去除空格;
       if (str == '' || str == undefined || str == null) {
           layer.msg('请输入地址，前中后不要包含空格', {icon: 2, time: 3000});
           return ;
       }
       var regBasicSalary = /(^[1-9]([0-9]+)?(\.[0-9]{1,2})?$)|(^(0){1}$)|
(^[0-9]\.[0-9]([0-9])?$)/;
       if (!regBasicSalary.test(basicSalary)) {
```

```
            layer.msg('工资输入错误,请输入正确的数值，例如正确：588.00 or 588 错误：
558a or adawd', {icon: 2, time: 3000});
            return ;
        };



   $.ajax({
      type: "POST",
      dataType: "json",
      contentType: "application/x-www-form-urlencoded;charset=UTF-8",
      url: "<%=basePath%>user/updateUser.action",
      data: $("#edit_user_form").serialize(),
      beforeSend: function () {
      },
      success: function (data) {
         if (data.code === 200) {
            layer.msg(data.msg, {icon: 1, time: 1000},function (index){
               window.location.reload();
               layer.close();
            });
         } else {
            layer.msg(data.msg, {icon: 2, time: 3000});
         }
      }
   });
};
```

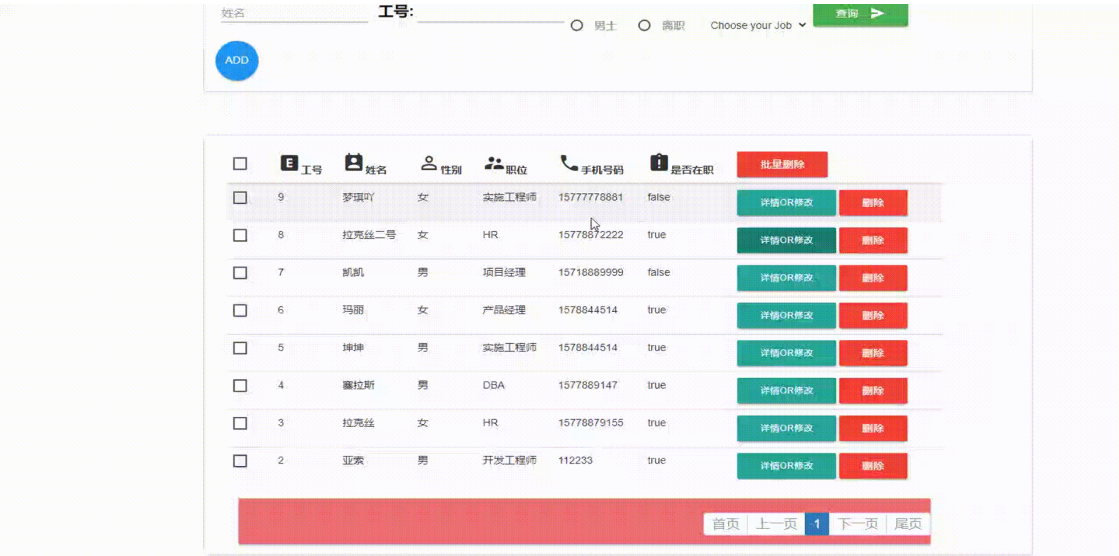
后端控制层

```
/**
 * 通过id获取职工信息  详细查看或者修改使用
 * @param id
 * @return
 */
@RequestMapping("/getUserById.action")
@ResponseBody
public Users getUserById(Long id) {
    if (id!=null){
            Users users = usersService.findById(id);
            log.info("get Users by id"+id);
              return users;
    }else {
        log.error("数据异常");
        return null;
    }
}
/**
 * 更新职员   form数据序列化
 */
@RequestMapping("/updateUser.action")
@ResponseBody
public  ResponseEntity<?>  userUpdate(Users users) {
    Result result = new Result();
    if(users.getId() != null){
        usersService.updateUser(users);
        result.setCode(200);
```

```
            result.setMsg("OK");
            log.info("操作成功,更新的职员id为"+users.getId());
            return ResponseEntity.ok(result);
        } else {
            result.setCode(500);
            result.setMsg("FALSE");
            log.error("操作失败"+result);
            return   ResponseEntity.ok(result);
        }
    }
```

服务层 修改需要事务支持

```
    /**
     *  详情查看 user by id
     * @param id
     * @return
     */
    public Users findById(Long id) {
        return userDao.getOne(id);
    }
     /**
     * 修改员工 需要事务支持
     * @param user
     */
    @Modifying
    @Transactional
    public void   updateUser(Users user) {
        if(!user.getIsWork()&&user.getLeaveTime()==null){
            user.setLeaveTime(new Date());
            userDao.save(user);
        }else {
            user.setLeaveTime(null);
            userDao.save(user);
        }
```



- **删除职员****

- 需求：通过ID删除用户
- AJAX异步提交ID到后端，controller层先判断ID参数是否为空，不为空时直接调用Service层删除方法，如果是批量删除的话后端需要处理前端提供的批量ID组成的字符串，前端将ID放进String字符串按照","进行拼接，利用Ajax传值，后端收到并对字符串进行校验是否为空，是否含有","对其进行String转List处理，循环List将List转为List 调用Service层删除方法即可。

  前端

  单删除

```
<a href="#" class="btn waves-effect waves-light red"
onclick="deleteUser(${user.id})">删除</a>
```

```
// 删除
function deleteUser(id) {
      layer.confirm('删除后不可恢复，谨慎操作！', {icon: 7, title: '警告'},
function (index) {
      $.post("<%=basePath%>user/deleteUser.action",{"id":id},
            function(data){
               if (data.code === 200) {
                  layer.msg(data.msg, {icon: 1, time: 1000},function (index)
{
                     window.location.reload();
                     layer.close();
                  });
               } else {
                  layer.msg(data.msg, {icon: 2, time: 3000});
               }
            });
   });
}
```

  批量删除时需要判断至少选中一个数据

  checkbok表头

```
<th><input type="checkbox" class="i-checks" name="test5" id="all" >
   <label for="all"></label></th>
```

  checkbok数据

```
<td>
   <input type="checkbox" class="i-checks" name="idone" id="idone"
value="${user.id}" >
   <label for="idone"></label>
</td>
```

  批量删除按钮

```
<th><a href="#" class="btn waves-effect waves-light red"
onclick="deleteAll()">批量删除</a></th>
```

全选按钮

```
//全选
var oall=document.getElementById("all");
var oid=document.getElementsByName("idone");
oall.onclick=function(){//勾选全选时
   for(var i=0;i<oid.length;i++){
      //所有的选择框和全选一致
      oid[i].checked=oall.checked;
   }
};
```

批量删除js

```
function deleteAll() {
   var idss = '';
   $('input:checkbox[name="idone"]').each(function () {
      if (this.checked === true) {
         idss += this.value + ',';
      }
   });
   if (!idss){
      layer.msg('请至少选中一个', {icon: 2, time: 1500});
      return false;
   } else {
   layer.confirm('批量删除后不可恢复，谨慎操作！', {icon: 7, title: '警告'}, function
(index) {
      $.ajax({
         type: 'POST',
         url: "<%=basePath%>user/deleteByIds.action",
         data: {ids: idss},
         dataType: 'json',
         success: function (data) {
            if (data.code === 200) {
               layer.msg(data.msg, {icon: 1, time: 1000},function (index){
                  window.location.reload();
                  layer.close();
               });
            } else {
               layer.msg(data.msg, {icon: 2, time: 3000});
            }
         }
      });
   });
   }
}
```

后端控制层

```
/**
 * 批量删除
 * @param ids
 * @return
 */
@RequestMapping(value = "/deleteByIds.action",method = RequestMethod.POST)
@ResponseBody
public ResponseEntity deleteByIds(String ids) {
    Result result = new Result();
```

```
    if (ids.contains(",")) {
        List lists = ConvertUtil.string2List(ids, ",");
        try {
            //批量删除
            if (lists != null && lists.size() >= 1) {
                log.info("批量删除开始 测试第一个数据ConvertUtil--" +
ConvertUtil.stringToLong(lists.get(1).toString()));
                for (int i = 0; i < lists.size(); i++) {

usersService.delete(ConvertUtil.stringToLong(lists.get(i).toString()));
                }
            }
        } catch (Exception e) {
            result.setCode(500);
            result.setMsg("FALSE");
            log.error("批量删除操作失败+"+e);
            return ResponseEntity.ok(result);
        }
        result.setCode(200);
        result.setMsg("OK");
        log.info("批量删除成功,ids为"+lists);
        return ResponseEntity.ok(result);
    }else {
        List lists = ConvertUtil.array2List(ids);
        usersService.delete(ConvertUtil.stringToLong(lists.get(0).toString()));
        result.setCode(200);
        result.setMsg("OK");
        log.info("批量删除失败，进入单个删除,id为"+lists);
        return  ResponseEntity.ok(result);
    }
}
/**
 * 删除职员
 */
@RequestMapping("/deleteUser.action")
@ResponseBody
public ResponseEntity<?> userDelete(Long id) {
    Result result = new Result();
    if(id != null ){ //success return
        usersService.delete(id);
        result.setCode(200);
        result.setMsg("OK");
        log.info("删除成功,id为"+id);
        return  ResponseEntity.ok(result);
    } else{  //false return
        result.setCode(500);
        result.setMsg("FALSE");
        log.error("删除失败,id为"+id);
        return   ResponseEntity.ok(result);
    }
}
```

服务层

```
//删除 需要事务支持
@Transactional
public void delete(Long id) {
    userDao.deleteById(id);
};
```

到这里完成了职员的增删查改，接下来需要依据职员数据进行分析

人事仪盘表

仪表盘主要分析

- 在职员工职位分布
- 在职员工工资分布
- 员工入职/离职情况

首先分析 员工职位分布情况

功能：饼图显示各个职位占比人数

需求：查询各个职位的人数

实现：查询count通过职位以及是否在职,因此需要一个枚举类放置职位名称

```
public enum Job {
    DEVELOPMENTENGINEER("开发工程师"),
    IMPLEMENTATIONENGINEER("实施工程师"),
    DBAENGINEER("DBA"),
    PRODUCTMANAGER("产品经理"),
    PROJECTMANAGER("项目经理"),
    HR("HR");
    private String code;
     Job(String code ) {
        this.code= code;
    }
    public  String getCode(){
         return this.code;
    }
```

```
}
```

SQL:

```
SELECT COUNT(*)  FROM TB_USERS WHERE JOB='?'
```

JPA: DAO层

```
    /**
     * 分职位查询在职的员工数量 饼图
     * @param job
     * @param iswork
     * @return
     */
    Long countByJobAndIsWork(String job,Boolean iswork);
```

Service层 通过FOR循环Job枚举类，查询各个职位的count存入List，前端取值时通过List下标取值。

```
/*
通过职位查询数量  饼图 p1
 */
public  List getUserCountByJob( ){
    List list = new ArrayList();
    for(Job job: Job.values()){
        Long count = userDao.countByJobAndIsWork(job.getCode(),Boolean.TRUE);
        System.out.println(job.getCode()+count);
       list.add(count);
    }
    return list;
}
```

Controller层

Echarts图表要动态显示时需要异步加载数据，这里选择了AJAX 通过GET请求数据放置图表数据字段

首次加载仪盘表界面时将数据存入Redis中，TTL为一个小时，key类型为String 所以取值时需要经过字符串截取及转Long类型

```
/*
 各职业人数分布 饼图 开发工程师 实施工程师 DBA 产品经理 项目经理 HR 顺序分布（size=6）
 */
@ResponseBody
@RequestMapping("/getPie1")
public ResponseEntity<?> getPie(){
    if (StringUtils.isNotEmpty(redisKeyUtilss.getString("getPie1"))){
        List lists =
ConvertUtil.string2List(redisKeyUtilss.getString("getPie1").substring(1,17), ",
");
        List list2 = new ArrayList();
        for (int i = 0; i < lists.size(); i++){
            list2.add(ConvertUtil.stringToLong(lists.get(i).toString()));
        }
        log.info("从redis中取出各职业人数分布 饼图"+list2);
        return ResponseEntity.ok(list2);
```

```
    } else {
        List list = usersService.getUserCountByJob();

redisKeyUtilss.setString("getPie1",list.toString());redisKeyUtilss.expire("getPie1",60*60);
        log.info("存入list 饼图");
        log.info("各职业人数分布 饼图 开发工程师 实施工程师 DBA 产品经理 项目经理 HR 顺序分布（size=6）"+list);
        return ResponseEntity.ok(list);
    }

}
```

前端

引入echarts.js

```
<script src="https://cdn.staticfile.org/echarts/4.3.0/echarts.min.js"></script>
```

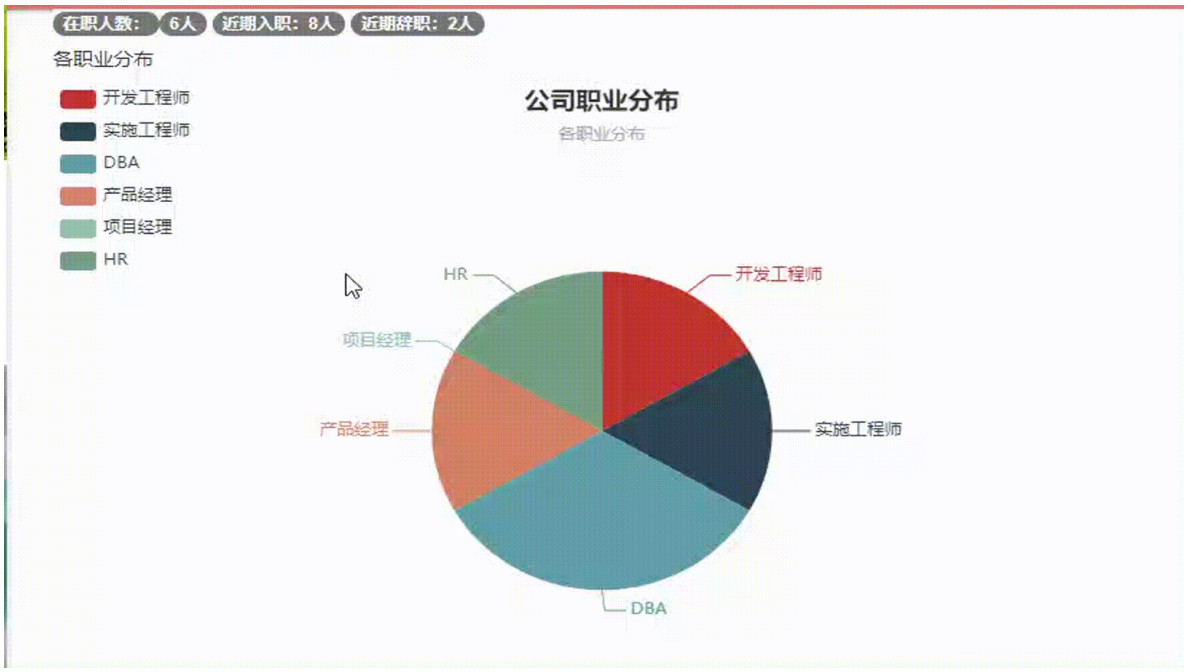
在页面上为饼图分配一个DOM

```
<div class="col-sm-6">
   <div class="ibox float-e-margins">
      <div class="ibox-title">
         <h5>各职业分布</h5>
      </div>
      <div class="ibox-content">
         <div class="echarts" style="height: 430px" id="echarts-pie-chart">
</div>
      </div>
   </div>
</div>
```

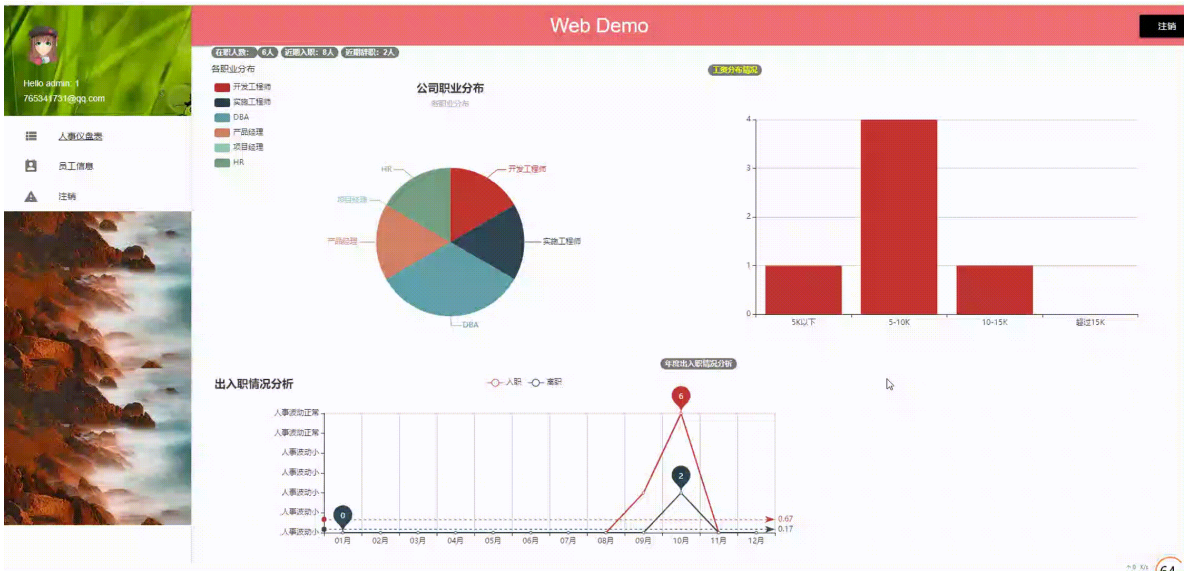
js初始化饼图

```
var pieChart = echarts.init(document.getElementById("echarts-pie-chart"));
var pieoption = null
$.get("<%=basePath%>admin/getPie1", function(data) {
   WorkerType = data;
   console.log(WorkerType);
   var pieoption = {
      title : {
         text: '公司职业分布',
         subtext: '各职业分布',
         x:'center'
      },
      tooltip : {
         trigger: 'item',
         formatter: "{a} <br/>{b} : {c} ({d}%)"
      },
      legend: {
         orient : 'vertical',
         x : 'left',
         data:['开发工程师' ,'实施工程师','DBA','产品经理','项目经理','HR']
      },
      calculable : true,
```

```
        series : [
            {
                name:'人数',
                type:'pie',
                radius : '55%',
                center: ['50%', '60%'],
                data:[
                    {value:WorkerType[0], name:'开发工程师'},
                    {value:WorkerType[1], name:'实施工程师'},
                    {value:WorkerType[2], name:'DBA'},
                    {value:WorkerType[3], name:'产品经理'},
                    {value:WorkerType[4], name:'项目经理'},
                    {value:WorkerType[5], name:'HR'}
                ]
            }
        ]
    };
    pieChart.setOption(pieoption);
    $(window).resize(pieChart.resize);
}) ;
```



总仪盘表页面



总结：趁着这次机会，将SpringBoot 2.x版本与SpringDataJpa跟Oracle数据库做了个整合，学习到了Oracle基本的使用和语法，SpringDataJpa是通过实体类来操控数据库表，以至数据库迁移性强，所以在线上版本中整合了MySQL，这次作业完成过程中也踩了一些坑，比较印象深刻的是SpringBoot集成JSP的项目要通过Maven打包成War包才能访问到JSP页面，Springboot最优搭档还是thymeleaf,但这次没有使用到。

系统主要完成功能：用户登录鉴权

管理员端：

对职员分页查询，增删查改，批量删除，批量导出，全部导出，职业分布饼图分析，工资分布柱形图，近一年人事变动折线图分析。

用户端：

修改密码，查看个人信息，修改个人信息，预览用户主页。

最后附上体验地址：http://101.201.237.88:8081/

管理员：账号： 1 密码： 1

普通用户：账号：坤坤二号 密码：222