

62_阶段测试：提交代码后验证教师列表缓存记录是否正确？

儒猿架构官网上线，内有石杉老师架构课最新大纲，儒猿云平台详细介绍，敬请浏览

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1、开篇

上节课主要介绍在代码级别如何对缓存数量进行限制，首先对 SpEL 做了简单介绍，着重介绍了在 Annotation 中的 SpEL 应用。随后根据缓存前 2 页的逻辑和搜索教师名字为空的条件对 Cacheable 注释进行了 SpEL 判断，从而达到限制缓存的目的。这节课我们会带大家把代码整体走一遍，测试一下缓存结果。今天课程的内容包括以下几个部分：

- 打包服务
- 上传服务
- 启动服务
- 测试教师列表功能

2、打包服务

这里直接对代码进行打包。如图 1 所示，打开我们熟悉的酒店管理后台应用服务，在 IntelliJ IDEA 中选择下方的“Terminal”按钮，在显示的命令行中（红色箭头的地方）输入对应的命令，用来对项目进行打包。

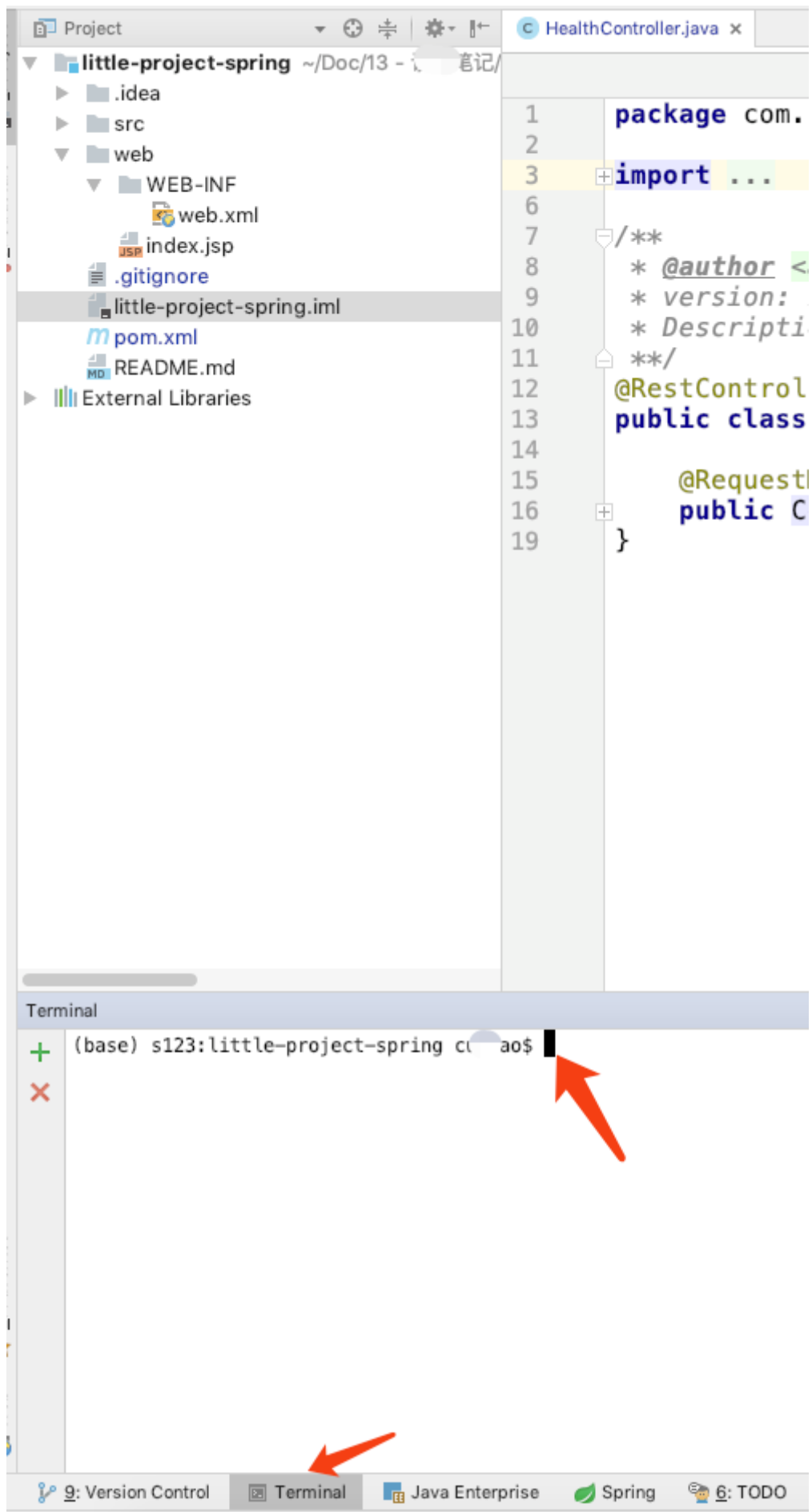


图 1 打开命令行

如图 2 所示，这里输入“mvn clean package”的命令。

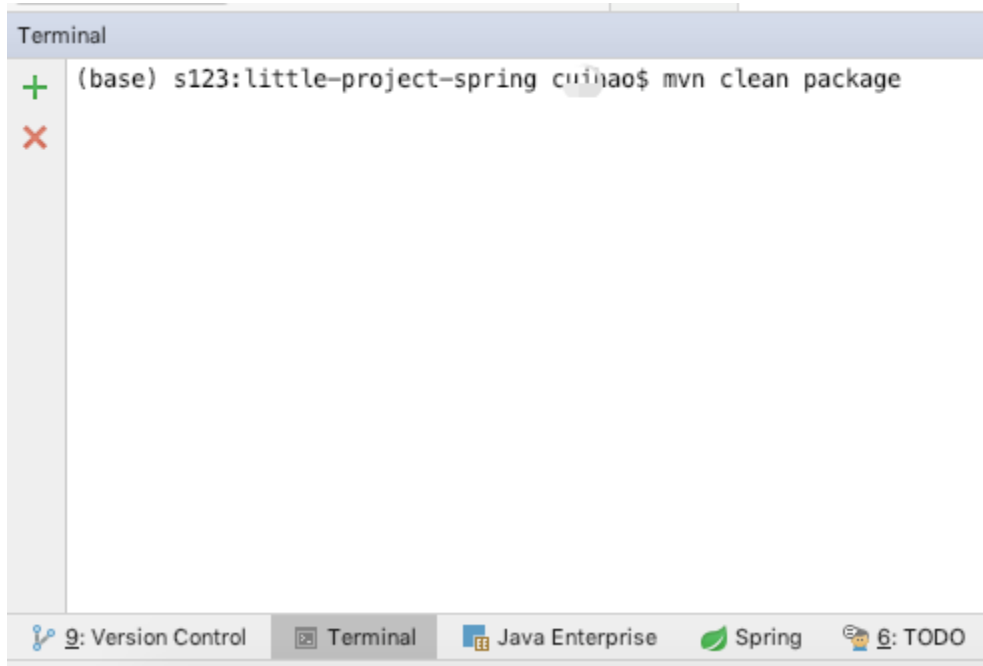


图 2 输入打包命令

在输入命令以后回车，如图 3 所示，会在输出信息中看到“BUILD SUCCESS”的字样表示，打包成功。同时在项目文件的 **target** 目录下面会看到一个“little-project-spring.war”的文件，这就是我们将要发布的 **war** 包。后面的操作会用到它。

Project Explorer:

- little-project-spring ~ /Doc/13 - 读书笔记/
 - .idea
 - src
 - target
 - classes
 - generated-sources
 - little-project-spring
 - maven-archiver
 - maven-status
 - little-project-spring.war**
 - web
 - .gitignore
 - little-project-spring.iml
 - pom.xml
 - README.md
- External Libraries

HealthController.java:

```
1 package com.ruyuan.lit
2
3 import ...
4
5
6
7 /**
8  * @author <a href="ma
9  * version: 1.0
10 * Description:健康检查的
11 */
12 @RestController
13 public class HealthCon
14
15     @RequestMapping(va
16     public CommonRespo
17
18
19 }
```

Terminal:

```
[INFO] --- maven-resources-plugin:2.6:testResources (default-testResources) @ li
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory /Users/cuihao/Doc/13 - 读 记/石杉/
[INFO] --- maven-compiler-plugin:3.1:testCompile (default-testCompile) @ little-
[INFO] Nothing to compile - all classes are up to date
[INFO] --- maven-surefire-plugin:2.12.4:test (default-test) @ little-project-spr
[INFO] Tests are skipped.
[INFO] --- maven-war-plugin:2.2:war (default-war) @ little-project-spring ---
[INFO] Packaging webapp
[INFO] Assembling webapp [little-project-spring] in [/Users/cu o/Doc/13 - 读书
[INFO] Processing war project
[INFO] Webapp assembled in [201 msecs]
[INFO] Building war: /Users/cuihao/Doc/13 - 读书笔记/石杉/ 战/Spri
[INFO] WEB-INF/web.xml already added, skipping
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 3.912 s
[INFO] Finished at: 2021-05-19T14:50:57+08:00
[INFO] -----
(base) s123:little-project-spring cuihao$
```

图 3 打包成功

3、上传服务

在上传服务（jar 包）之前需要保证，在对应的 ECS 中建立服务运行的目录如下：

`/home/admin/little-project-spring/`

这个目录已经由儒猿团队在 ECS 的镜像中创建好了，大家不用手动创建，我们后面的发布就基于这个目录。其中“/home/admin/little-project-spring”是用来存放部署脚本的，注意我们这里使用的 `deploy.sh` 脚本已经由儒猿团队上传了。

“/home/admin/little-project-spring/”目录是存放服务的 war 包的，这个包是需要我们自己上传的。

在 ECS 上建立好目录结构以后，再回到本地的项目中，依旧是在 IntelliJ IDEA 的命令行中输入以下命令：

```
scp target/little-project-spring.war root@47.117.120.102:/home/admin/little-project-spring /
```

命令的意思是通过 `scp` 命令将刚才打包的“little-project-spring.war”文件 copy 到对应 ECS 服务器的“/home/admin/little-project-spring/”目录中。这里的

“47.117.120.102”是我的测试地址，大家可以更换为自己申请的 ECS 的 IP 地址。

这里需要特别说明一下，由于我在执行命令的根目录在“little-project-spring”项目下面，如果你在其他的地方执行上述两条命令，需要指定好源文件的目录。同时在使用 `scp` 命令以后会让大家输入服务器的密码，该密码可以从实战云平台上获取。完成上面两个命令以后，服务就已经部署到 ECS 了。

4、启动服务

完成部署以后，需要到 ECS 服务器上面启动部署的酒店管理后台的服务。还是登录 ECS 服务器，通过以下命令进入到“`deploy.sh`”文件所在的目录。

```
cd /home/admin/little-project-spring
```

`deploy.sh` 文件是儒猿团队为大家生成的发布的脚本文件，通过 Linux shell 脚本完成发布的参数配置和启动命令。包括启动应用等待的时间、应用端口号、健康检查的 URL 以及 jar 包的目录和日志信息。有兴趣的同学可以打开看看，这里就不做展开的介绍了。

保证当前目录下面存在“deploy.sh”文件，使用如下命令启动服务。

```
sh deploy.sh restart
```

命令使用了“restart”作用与“start”是一致的，用“restart”的目的以免在重复发布过程中，学员忘记是否启动过服务。因此使用“restart”，这样即便是已经启动过服务，也会重新加载服务。

运行命令在看到图 4 所示的“success”字样的时候，就说明服务启动成功了。

```
[root@iZuf64qotsm6gzy9jnkW8cZ little-project-spring]# sh deploy.sh restart
no java process
starting java process
Using CATALINA_BASE:   /home/admin/little-project-spring/apache-tomcat-9.0.45
Using CATALINA_HOME:   /home/admin/little-project-spring/apache-tomcat-9.0.45
Using CATALINA_TMPDIR: /home/admin/little-project-spring/apache-tomcat-9.0.45/temp
Using JRE_HOME:        /usr
Using CLASSPATH:       /home/admin/little-project-spring/apache-tomcat-9.0.45/bin/bootstrap.jar:/home/admin/little
-project-spring/apache-tomcat-9.0.45/bin/tomcat-juli.jar
Using CATALINA_OPTS:
Tomcat started.
started java process
checking http://127.0.0.1:8090
Wait app to pass health check: 1...
code is 200
check http://127.0.0.1:8090 success
```

图 4 启动服务成功。

5、测试教师列表功能

在服务部署并且启动以后，我们先准备一些数据，尽管这些数据猿团队已经帮我们写入到 ECS 上的 MySQL 中了。这里还是简单过一下。

如图 5 所示，这里是 t_teacher 表的初始化脚本。假设教师列表是按照 Id 从小到大进行展示了，那么 id = 1-10 的 10 条记录是会被缓存的，11、12、13、14 这 4 条记录是不会缓存的。

```

truncate table spring.t_teacher;
INSERT INTO spring.t_teacher (id, teacher_name, course, score, teaching_days, status, teaching_count, price_of_day, start
VALUES (1, '张三', '00', 4.69, 1, '1', 33, 170.00, '2020-04-23 23:20:53', '专注于6-10岁儿童教育', '常年做儿童教育, 经验丰富', 'h
INSERT INTO spring.t_teacher (id, teacher_name, course, score, teaching_days, status, teaching_count, price_of_day, start
VALUES (2, '李四', '01', 4.88, 2, '1', 44, 200.00, '2019-04-23 23:21:00', '专注于6-10岁儿童教育', '常年做儿童教育, 经验丰富', 'h
INSERT INTO spring.t_teacher (id, teacher_name, course, score, teaching_days, status, teaching_count, price_of_day, start
VALUES (3, '王五', '02', 4.41, 5, '1', 55, 190.00, '2016-04-23 23:21:10', '专注于6-10岁儿童教育', '常年做儿童教育, 经验丰富', 'h
INSERT INTO spring.t_teacher (id, teacher_name, course, score, teaching_days, status, teaching_count, price_of_day, start
VALUES (4, '赵六', '03', 4.62, 0, '1', 66, 160.00, '2021-04-25 23:43:53', '专注于6-10岁儿童教育', '常年做儿童教育, 经验丰富', 'h
INSERT INTO spring.t_teacher (id, teacher_name, course, score, teaching_days, status, teaching_count, price_of_day, start
VALUES (5, '钱老师', '04', 4.98, 2, '1', 73, 205.00, '2019-04-23 23:21:00', '专注于6-10岁儿童教育', '常年做儿童教育, 经验丰富', '
INSERT INTO spring.t_teacher (id, teacher_name, course, score, teaching_days, status, teaching_count, price_of_day, start
VALUES (6, '孙老师', '05', 4.51, 5, '1', 41, 193.00, '2016-04-23 23:21:10', '专注于6-10岁儿童教育', '常年做儿童教育, 经验丰富', '
INSERT INTO spring.t_teacher (id, teacher_name, course, score, teaching_days, status, teaching_count, price_of_day, start
VALUES (7, '周老师', '06', 4.72, 1, '1', 13, 167.00, '2020-04-25 23:43:53', '专注于6-10岁儿童教育', '常年做儿童教育, 经验丰富', '
INSERT INTO spring.t_teacher (id, teacher_name, course, score, teaching_days, status, teaching_count, price_of_day, start
VALUES (8, '张无忌', '01', 4.52, 1, '1', 20, 188.00, '2020-02-23 23:20:53', '专注于6-10岁儿童教育', '常年做儿童教育, 经验丰富', '
INSERT INTO spring.t_teacher (id, teacher_name, course, score, teaching_days, status, teaching_count, price_of_day, start
VALUES (9, '张三丰', '02', 4.64, 2, '1', 39, 203.00, '2018-04-23 23:21:00', '专注于6-10岁儿童教育', '常年做儿童教育, 经验丰富', '
INSERT INTO spring.t_teacher (id, teacher_name, course, score, teaching_days, status, teaching_count, price_of_day, start
VALUES (10, '杨过', '03', 4.85, 5, '1', 48, 197.00, '2017-04-27 23:21:10', '专注于6-10岁儿童教育', '常年做儿童教育, 经验丰富', '
INSERT INTO spring.t_teacher (id, teacher_name, course, score, teaching_days, status, teaching_count, price_of_day, start
VALUES (11, '令狐冲', '04', 4.31, 0, '1', 31, 164.00, '2021-01-25 23:43:53', '专注于6-10岁儿童教育', '常年做儿童教育, 经验丰富', '
INSERT INTO spring.t_teacher (id, teacher_name, course, score, teaching_days, status, teaching_count, price_of_day, start
VALUES (12, '段誉', '05', 4.78, 2, '1', 90, 208.00, '2017-10-23 23:21:00', '专注于6-10岁儿童教育', '常年做儿童教育, 经验丰富', '
INSERT INTO spring.t_teacher (id, teacher_name, course, score, teaching_days, status, teaching_count, price_of_day, start
VALUES (13, '周瑜', '06', 4.59, 5, '1', 27, 148.00, '2014-06-13 23:21:10', '专注于6-10岁儿童教育', '常年做儿童教育, 经验丰富', '
INSERT INTO spring.t_teacher (id, teacher_name, course, score, teaching_days, status, teaching_count, price_of_day, start
VALUES (14, '乔帮主', '00', 4.81, 1, '1', 102, 288.00, '2010-09-01 23:43:53', '专注于6-10岁儿童教育', '常年做儿童教育, 经验丰富', '

```

图 5 数据库初始化脚本

介绍完数据我们来到“首页”，教师列表已经加载了。第一次数据加载应该是从数据获取的，此时我们可以向下滑动教师列表对其进行刷新，小程序会调用 TeacherController 中的 getPage 方法。由于第一次获取教师列表之后，数据会被缓存起来，由于是第一次缓存应该是保存 1-5 条的记录。

在 ECS 服务器通过如下命令进入到对应 debug 日志的目录，并且查看日志内容。

```
cd /home/admin/little-project-spring/logs/debug
```

```
cat little-project-spring_debug.log
```

如图 6 所示，在日志中可以看到缓存起效了，并且在生成缓存的 Key 中有 0-5 的字样，其中 0 是 startIndex 也就是教师列表的开始偏移量，5 是 endIndex 是教师列表的长度。简单来说就是缓存了从偏移量 0 开始的 5 条记录，也就是第 1 页的教师列表，是从教师 Id: 1-5 的教师信息。


```

[2021-06-04 10:31:38.698] INFO com.ruyuan.little.project.spring.cache.TeacherKeyGenerator 31 - 根据教师类型和状态查询教师列表缓存KeyGenerator
[2021-06-04 10:31:38.698] INFO com.ruyuan.little.project.spring.cache.TeacherKeyGenerator 36 - 生成的缓存key:TeacherServiceImpl-getPage=null-null-0-5-teaching_count-desc
[2021-06-04 10:31:38.698] INFO com.ruyuan.little.project.spring.service.impl.TeacherServiceImpl 44 - 通过数据库查询教师列表
[2021-06-04 10:31:38.708] INFO com.ruyuan.little.project.spring.aspect.ControllerLogAspect 69 - 请求处理时间差:24, 响应结果:{code:200,data:{rows:[{"course":"00","courseName":"语文","description":"专注于6-10岁儿童教育","detail":"常年做儿童教育, 经验丰富","endIndex":10,"id":14,"page":0,"photo":"https://weapp-1303909892.cos.ap-shanghai.myqcloud.com/spring/07.png","priceOfDay":288.00,"score":4.81,"size":10,"startIndex":0,"startTime":"2010-09-01 23:43:53","status":1,"teacherName":"乔帮主","teachingCount":192,"teachingDays":1}, {"course":"05","courseName":"生物","description":"专注于6-10岁儿童教育","detail":"常年做儿童教育, 经验丰富","endIndex":10,"id":12,"page":0,"photo":"https://weapp-1303909892.cos.ap-shanghai.myqcloud.com/spring/05.png","priceOfDay":208.00,"score":4.78,"size":10,"startIndex":0,"startTime":"2017-10-23 23:21:00","status":1,"teacherName":"段誉","teachingCount":90,"teachingDays":2}, {"course":"04","courseName":"化学","description":"专注于6-10岁儿童教育","detail":"常年做儿童教育, 经验丰富","endIndex":10,"id":5,"page":0,"photo":"https://weapp-1303909892.cos.ap-shanghai.myqcloud.com/spring/05.png","priceOfDay":205.00,"score":4.98,"size":10,"startIndex":0,"startTime":"2019-04-23 23:21:00","status":1,"teacherName":"钱老师","teachingCount":73,"teachingDays":2}, {"course":"03","courseName":"物理","description":"专注于6-10岁儿童教育","detail":"常年做儿童教育, 经验丰富","endIndex":10,"id":4,"page":0,"photo":"https://weapp-1303909892.cos.ap-shanghai.myqcloud.com/spring/04.png","priceOfDay":160.00,"score":4.62,"size":10,"startIndex":0,"startTime":"2021-04-25 23:43:53","status":1,"teacherName":"赵六","teachingCount":66,"teachingDays":2}, {"course":"02","courseName":"英语","description":"专注于6-10岁儿童教育","detail":"常年做儿童教育, 经验丰富","endIndex":10,"id":3,"page":0,"photo":"https://weapp-1303909892.cos.ap-shanghai.myqcloud.com/spring/03.png","priceOfDay":190.00,"score":4.41,"size":10,"startIndex":0,"startTime":"2016-04-23 23:21:10","status":1,"teacherName":"王五","teachingCount":55,"teachingDays":5}],total":14},"message":"成功"}

```

图 6 缓存第 1 页

还是回到小程序的“首页”，在第 1 页的基础上往下滑动，也就是滑动到第 2 页。在 ECS 服务器通过如下命令进入到对应 debug 日志的目录，并且查看日志内容。

```
cd /home/admin/little-project-spring/logs/debug
```

```
cat little-project-spring_debug.log
```

如图 7 所示，日志内容和图 6 相似，唯一不同的是从“0-5”换成了“5-5”，也即是 从偏移量 5 开始，对长度为 5 的教师列表进行缓存，缓存的内容显示在下面。

```

[2021-06-04 10:32:02.376] INFO com.ruyuan.little.project.spring.cache.TeacherKeyGenerator 31 - 根据教师类型和状态查询教师列表缓存KeyGenerator
[2021-06-04 10:32:02.376] INFO com.ruyuan.little.project.spring.cache.TeacherKeyGenerator 36 - 生成的缓存key:TeacherServiceImpl-getPage=null-null-5-5-teaching_count-desc
[2021-06-04 10:32:02.379] INFO com.ruyuan.little.project.spring.aspect.ControllerLogAspect 69 - 请求处理时间差:8, 响应结果:{code:200,data:{rows:[{"course":"03","courseName":"物理","description":"专注于6-10岁儿童教育","detail":"常年做儿童教育, 经验丰富","endIndex":10,"id":10,"page":0,"photo":"https://weapp-1303909892.cos.ap-shanghai.myqcloud.com/spring/03.png","priceOfDay":197.00,"score":4.85,"size":10,"startIndex":5,"startTime":"2017-04-27 23:21:10","status":1,"teacherName":"杨过","teachingCount":48,"teachingDays":5}, {"course":"01","courseName":"数学","description":"专注于6-10岁儿童教育","detail":"常年做儿童教育, 经验丰富","endIndex":10,"id":2,"page":0,"photo":"https://weapp-1303909892.cos.ap-shanghai.myqcloud.com/spring/02.png","priceOfDay":200.00,"score":4.88,"size":10,"startIndex":5,"startTime":"2019-04-23 23:21:00","status":1,"teacherName":"李四","teachingCount":44,"teachingDays":2}, {"course":"05","courseName":"生物","description":"专注于6-10岁儿童教育","detail":"常年做儿童教育, 经验丰富","endIndex":10,"id":6,"page":0,"photo":"https://weapp-1303909892.cos.ap-shanghai.myqcloud.com/spring/06.png","priceOfDay":193.00,"score":4.51,"size":10,"startIndex":0,"startTime":"2016-04-23 23:21:10","status":1,"teacherName":"孙老师","teachingCount":41,"teachingDays":5}, {"course":"02","courseName":"英语","description":"专注于6-10岁儿童教育","detail":"常年做儿童教育, 经验丰富","endIndex":10,"id":9,"page":0,"photo":"https://weapp-1303909892.cos.ap-shanghai.myqcloud.com/spring/02.png","priceOfDay":203.00,"score":4.64,"size":10,"startIndex":0,"startTime":"2018-04-23 23:21:00","status":1,"teacherName":"张三丰","teachingCount":39,"teachingDays":2}, {"course":"00","courseName":"语文","description":"专注于6-10岁儿童教育","detail":"常年做儿童教育, 经验丰富","endIndex":10,"id":1,"page":0,"photo":"https://weapp-1303909892.cos.ap-shanghai.myqcloud.com/spring/01.png","priceOfDay":170.00,"score":4.69,"size":10,"startIndex":0,"startTime":"2020-04-23 23:20:53","status":1,"teacherName":"张三","teachingCount":33,"teachingDays":1}],total":14},"message":"成功"}

```

图 7 缓存第 2 页

依旧回到小程序的“首页”，在第 2 页的基础上往下滑动，也就是滑动到第 3 页。在 ECS 服务器通过如下命令进入到对应 debug 日志的目录，并且查看日志内容。

```
cd /home/admin/little-project-spring/logs/debug
```

```
cat little-project-spring_debug.log
```

如图 8 所示，和前面两次不同，日志中再也没有缓存的信息，而是“通过数据库查询教师列表”，因为我们 Cacheable 中的 condition 起效了，大于 2 页的数据不再做缓存了。因此，直接从数据库中获取教师列表信息。

```

[2021-06-04 10:32:04.050] INFO com.ruyuan.little.project.spring.service.impl.TeacherServiceImpl 44 - 通过数据库查询教师列表
[2021-06-04 10:32:04.064] INFO com.ruyuan.little.project.spring.aspect.ControllerLogAspect 69 - 请求处理时间差:19, 响应结果:{code:200,data:{rows:[{"course":"04","courseName":"化学","description":"专注于6-10岁儿童教育","detail":"常年做儿童教育, 经验丰富","endIndex":10,"id":11,"page":0,"photo":"https://weapp-1303909892.cos.ap-shanghai.myqcloud.com/spring/04.png","priceOfDay":164.00,"score":4.31,"size":10,"startIndex":0,"startTime":"2021-01-25 23:43:53","status":1,"teacherName":"令狐冲","teachingCount":31,"teachingDays":0}, {"course":"00","courseName":"政治","description":"专注于6-10岁儿童教育","detail":"常年做儿童教育, 经验丰富","endIndex":10,"id":13,"page":0,"photo":"https://weapp-1303909892.cos.ap-shanghai.myqcloud.com/spring/06.png","priceOfDay":148.00,"score":4.59,"size":10,"startIndex":0,"startTime":"2016-04-13 23:21:10","status":1,"teacherName":"周鲁","teachingCount":27,"teachingDays":5}, {"course":"01","courseName":"数学","description":"专注于6-10岁儿童教育","detail":"常年做儿童教育, 经验丰富","endIndex":10,"id":8,"page":0,"photo":"https://weapp-1303909892.cos.ap-shanghai.myqcloud.com/spring/01.png","priceOfDay":188.00,"score":4.52,"size":10,"startIndex":0,"startTime":"2020-02-23 23:20:53","status":1,"teacherName":"张无忌","teachingCount":28,"teachingDays":1}, {"course":"06","courseName":"政治","description":"专注于6-10岁儿童教育","detail":"常年做儿童教育, 经验丰富","endIndex":10,"id":7,"page":0,"photo":"https://weapp-1303909892.cos.ap-shanghai.myqcloud.com/spring/07.png","priceOfDay":167.00,"score":4.72,"size":10,"startIndex":0,"startTime":"2020-04-25 23:43:53","status":1,"teacherName":"周老师","teachingCount":13,"teachingDays":1}],total":14},"message":"成功"}

```


图 8 没有对第 3 页进行缓存

6、总结

本节课我们会带大家把限制缓存数量的代码整体走一遍，准备了 14 条测试数据，每页 5 条数据，前 2 页进行缓存，也就是前面 10 条数据进行缓存，后面的 11、12、13、14 条记录不进行缓存。由于本节是这周的最后一节课，这里将本周课程做一个总结。本周从教师模块的业务流程入手，提出了高并发下教师列表热点数据查询的问题，随即使用 **Spring Cache** 进行缓存从而解决该问题。然而缓存过多对系统造成大量负担，同时没有必要的缓存对用户的体验也没有特别提升，因此对缓存的数量进行了限制。使用 **SpEL** 和 **Spring Cache** 组合完成了限制缓存的需求。下周我们会介绍下单模块的相关功能。下期见，拜拜。