

测试报告

在线测试子系统

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1 引言

1.1 编写目的

本文档的编写是出于测试教务系统之在线测试子系统，主要通过几个步骤来完成测试的过程。对于检测出来的错误，通过提交给程序员和管理人员进行修正；如果出现实在修正不了的问题（比如说在需求分析阶段就埋下的隐患），依据问题的大小给出评估，从而使管理人和客户有一个认识，得到改变功能设计或者是摒除功能模块甚至是放弃项目的决定。

1.2 背景

1) 软件系统名称

教务系统之在线测试子系统

2) 任务提出者

浙江大学软件工程基础课程任课老师——陈越

3) 开发者

浙江大学 2012-2013 学年春夏学期软件工程基础课程红五组

4) 用户群

任课教师、在读学生、教务中心职工、系统管理员

5) 实现该软件的计算机网络

由若干台 PC 机组成局域网

6) 该软件系统同其他子系统的相互来往关系

与选课子系统及信息子系统，从中获取数据信息。

2 总体测试计划

2.1 测试策略

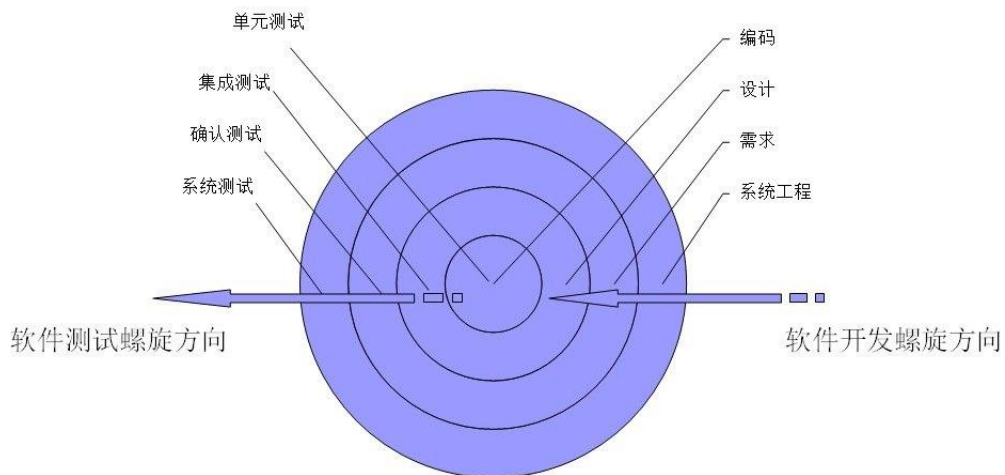


FIGURE 1 测试策略 螺旋图

整体采用面向对象软件的测试策略。

2.1.1 单元测试

四个大类：

题库管理类、试卷管理类、在线测试类、统计分析类。

2.1.2 集成测试

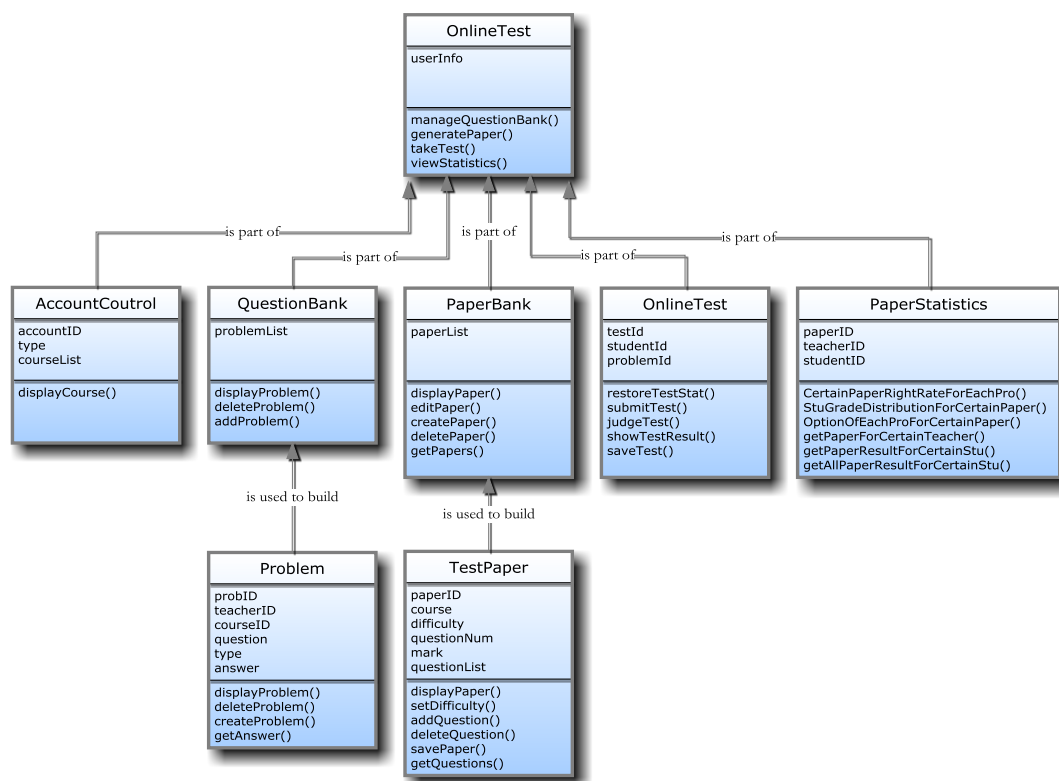


FIGURE 2 自底向上集成

2.1.3 确认测试

确认测试始于集成测试的结束，此时已测试完单个构件，软件已组装成完整的软件包，且接口错误已被发现和改正。在确认测试或系统级测试时，测试便集中于用户可见的动作和用户可识别的系统输出。

将会有两轮测试： α 测试(用户在开发者的场所进行)与 β 测试(在最终用户场所执行)。

2.1.4 系统测试

- 1) 安全测试：权限的管理；
- 2) 压力测试：用户并发量和数据量测试；
- 3) 性能测试：响应时间的测试。

2.2 测试范围

2.2.1 验收测试

验收测试是指系统开发生命周期方法论的一个阶段，这时相关的用户或独立测试人员根据测试计划和结果对系统进行测试和接收。它让系统用户决定是否接收系统。它是一项确定产品是否能够满足合同或用户所规定需求的测试。

2.2.2 功能测试

1. 页面链接检查：每一个链接是否都有对应的页面，并且页面之间切换正确。
2. 相关性检查：删除/增加一项会不会对其他项产生影响，如果产生影响，这些影响是否都正确。
3. 检查按钮的功能是否正确：如新建、编辑、删除、关闭、返回、保存、导入，上一页，下一页，页面跳转，重置等功能是否正确。
4. 字符串长度检查：输入超出需求所说明的字符串长度的内容，看系统是否检查字符串长度。还要检查需求规定的字符串长度是否是正确的。
5. 字符类型检查：在应该输入指定类型的内容的地方输入其他类型的内容。
6. 标点符号检查：输入内容包括各种标点符号，特别是空格，各种引号，回车键，看系统处理是否正确。
7. 特殊字符检查：输入特殊符号，如@、#、\$、%、!等，看系统处理是否正确。
8. 中文字符处理：在可以输入中、英文的系统输入中文，看会否出现乱码或出错。
9. 检查信息的完整：在查看信息和更新信息时，查看所填写的信息是不是全部更新，更新信息和添加信息是否一致。
10. 信息重复：在一些需要命名，且名字应该唯一的信息输入重复的名字或 ID，看系统有没有处理，会否报错，重名包括是否区分大小写，以及在输入内容的前后输入空格，系统是否做出正确处理。
11. 检查删除功能：在一些可以一次删除多个信息的地方，不选择任何信息，按“delete”，看系统如何处理，会否出错；然后选择一个和多个信息，进行删除，看是否正确处理。如果有多页，翻页选，

看系统是否都正确删除，并且要注意，删除的时候是否有提示，让用户能够更正错误，不误删除。

12. 检查添加和修改是否一致：检查添加和修改信息的要求是否一致，例如添加要求必填的项，修改也应该必填；添加规定为整型的项，修改也必须为整型。
13. 检查修改重名：修改时把不能重名的项改为已存在的内容，看会否处理，报错。
14. 重复提交表单：一条已经成功提交的纪录，返回后再提交，看看系统是否做了处理。
15. 检查多次使用返回键的情况：在有返回键的地方，返回到原来页面，重复多次，看会否出错。
16. 搜索检查：有搜索功能的地方输入系统存在和不存在的内容，看搜索结果是否正确。如果可以输入多个搜索条件，可以同时添加合理和不合理的条件，看系统处理是否正确，搜索的时候同样要注意特殊字符，某些系统会在输入特殊字符的时候，将系统中所有的信息都搜索到。
17. 输入信息位置：注意在光标停留的地方输入信息时，光标和所输入的信息会否跳到别的地方。
18. 上传下载文件检查：上传下载文件的功能是否实现，上传文件是否能打开。对上传文件的格式有何规定，系统是否有解释信息，并检查系统是否能够做到。下载文件能否打开或者保存，下载的文件是否有格式要求，如需要特殊工具才可以打开等。上传文件测试同时应该测试，如果将不能上传的文件后缀名修改为可以上传文件的后缀名，看是否能够上传成功，并且，上传文件后，重新修改，看上传的文件是否存在。
19. 必填项检查：应该填写的项没有填写时系统是否都做了处理，对必填项是否有提示信息，如在必填项前加“*”；对必填项提示返回后，焦点是否会自动定位到必填项。
20. 快捷键检查：是否支持常用快捷键，如 Ctrl+C、Ctrl+V、Backspace 等，对一些不允许输入信息的字段，快捷方式是否也做了限制。
21. 回车键检查：在输入结束后直接按回车键，看系统处理如何，会否报错。

2.2.3 边界测试

边界值分析也是一种黑盒测试方法, 适度等价类分析方法的一种补充, 由长期的测试工作经验得知, 大量的错误是发生在输入或输出的边界上。因此针对各种边界情况设计测试用例, 可以查出更多的错误。

2.2.4 性能测试

测试目标: 验证软件系统是否能够达到用户提出的性能指标, 同时发现软件系统中存在的性能瓶颈, 优化软件。

测试类型: 压力测试

观察指标:

1. Avg Rps: 平均每秒钟响应次数=总请求时间 / 秒数;
2. Avg time to last byte per terstion (mstes): 平均每秒业务脚本的迭代次数;
3. Successful Rounds: 成功的请求;
4. Failed Rounds : 失败的请求;
5. Successful Hits : 成功的点击次数;
6. Failed Hits : 失败的点击次数;
7. Hits Per Second : 每秒点击次数;
8. Successful Hits Per Second : 每秒成功的点击次数;
9. Failed Hits Per Second : 每秒失败的点击次数;
10. Attempted Connections : 尝试链接数。

开始标准: 轮廓设计已经完成。

完成标准:

所有的测试用例都被执行并通过;

所有被发现的缺陷都被修复并重新测试;

性能需求达到预期标准;

性能测试报告完成。

测试步骤：

1. 制定目标和分析系统
 2. 选择测试度量的方法
 3. 学习的相关技术和工具
 4. 制定评估标准
 5. 设计测试用例
 6. 运行测试用例
 7. 分析测试结果
-

2.2.5 接口测试

接口测试的目的是测试接口，尤其是那些与系统相关联的外部接口，测试的重点是要检查数据的交换，传递和控制管理过程，还包括处理的次数。外部接口测试一般是作为系统测试来看待的。

不是所有的团队都可以在一个隔离的测试环境中进行测试工作的，因此使得对外部接口的测试显得困难。我们应该确保较早地与相关的组织协调好并确定进行外部接口测试的方案。有时候相关的组织只是人工的静态的审阅一次数据而并不真正的用这些数据来测试。等等这些都增加了实际测试执行中遇到的风险，但有些时候是可以避免的。

3 功能测试

3.1 权限控制模块

3.1.1 功能介绍

1. 任课教师：
能进入题库管理界面浏览自己的题库并对其进行增删改查；
能进入试卷管理界面浏览自己的试卷库并执行生成、删除、查询；
能进入统计分析界面对自己的题库和试卷的得分统计情况进行查询。
2. 学生：

- 能进入学生自测界面进行答卷、浏览试卷；
能进入统计分析界面查看自己的历史得分记录。
3. 管理员：
能进入题库管理界面浏览所有题库并对其进行增删改查；
能进入试卷管理界面浏览所有试卷库并执行生成、删除、查询；
能进入统计分析界面对所有题库和试卷的得分统计情况进行查询；
能进入统计分析界面查看学生的历史得分记录。
4. 系统管理员：
如管理员。

3.1.2 测试用例

No.	1
测试功能	教师登录
操作步骤	1) 登录在线自测子系统 2) 进入某课程
操作数据	教师账号
预期结果	显示该任课教师所任教课程，进入某课程后显示该课程所有试卷，旁边附有各模块操作面板
实际结果	

	<div><div>Teaching Service System</div><div><div>Logout(teacher)(Teacher)</div><div>Change Password</div><div>Information Management</div><div>Test Online Subsystem</div><div>Resource Sharing Subsystem</div><div>Course Arrangement Subsystem</div><div>Apply Class</div><div>Classroom Management</div><div>Course Selection</div><div>Score Management</div></div><div>Home » Online Test Subsystem » Course List » OS » Papers</div><div>Papers of OS<div>Displaying 1-8 of 8 result(s).</div><div><div><div>ID: 7</div><div>Is Publish: 1</div><div>Timelimit: 00:09:00</div></div><div><div>ID: 8</div><div>Is Publish: 0</div><div>Timelimit: 00:00:01</div></div><div><div>ID: 9</div><div>Is Publish: 1</div><div>Timelimit: 00:22:22</div></div><div><div>ID: 15</div><div>Is Publish: 0</div><div>Timelimit: 01:00:00</div></div><div><div>ID: 17</div><div>Is Publish: 0</div><div>Timelimit: 01:00:00</div></div></div><div><div>Operations</div><div>QuestionBank</div><div>PaperBank Management</div><div>Statistics Analysis</div></div></div></div>
结果分析	登录及初始跳转正常

No.	2
测试功能	学生登录
操作步骤	1) 登录在线自测子系统 2) 进入某课程 3) 选择某份试卷
操作数据	学生账号
预期结果	显示该学生课程显示在线测试和统计分析按钮； 显示该课程发布试卷列表； 显示改份试卷题目列表。
实际结果	<div><div>Teaching Service System</div><div><div>Logout(student)(Student)</div><div>Change Password</div><div>Information Management</div><div>Test Online Subsystem</div><div>Resource Sharing Subsystem</div><div>Course Arrangement Subsystem</div><div>Apply Class</div><div>Classroom Management</div><div>Course Selection</div><div>Score Management</div></div><div>Home » Online Test Subsystem » Courses List</div><div>Course List<div>Displaying 1-6 of 6 result(s).</div><div><div><div>Course Number: 100000</div><div>Course Name: OS</div></div><div><div>Course Number: 200000</div><div>Course Name: DataStructure</div></div><div><div>Course Number: 300000</div><div>Course Name: calculus</div></div><div><div>Course Number: 400000</div><div>Course Name: english</div></div><div><div>Course Number: 500000</div><div>Course Name: mathematics</div></div><div><div>Course Number: 600000</div><div>Course Name: C++</div></div></div></div></div>

Teaching Service System

Logout(student)(Student)Change PasswordInformation ManagementTest Online SubsystemResource Sharing Subsystem

Course Arrangement SubsystemApply ClassClassroom ManagementCourse SelectionScore Management

Home » Online Test Subsystem » Course List » OS » Papers

Papers of OS

Operations

Historical Performance

Displaying 1-4 of 4 result(s).

ID: 7

Is Publish: 1

Timelimit: 00:09:00

ID: 9

Is Publish: 1

Timelimit: 00:22:22

ID: 20

Is Publish: 1

Timelimit: 00:14:00

ID: 28

Is Publish: 1

Timelimit: 00:26:00

Home » Online Test Subsystem » Course List » OS » 7

View Paper

Operations

Take Online Test

Teacher: Cai Deng

Course: OS

Is Publish: 1

Timelimit: 00:09:00

Displaying 1-8 of 8 result(s).

id	question	selection_a	selection_b	selection_c	selection_d	type
11	The earth is round.	null	null	null	null	1
20	The nature of software applications can be characterized by their information	complexity	content	determinacy	both B and C	0
28	Which question no longer concerns the modern software engineer?	Why does computer hardware cost so much?	Why does software take a long time to finish?	Why does it cost so much to develop a piece of software?	Why can't software errors be removed from products prior to delivery?	0
15	The nature of software applications can be characterized by their information	complexity	content	determinacy	both B and C	0
39	Modern software applications are so complex that it is hard to develop mutually exclusive category names.	null	null	null	null	1
8	are you all right?	fill	fill	fill	fill	1
13	Which question no longer concerns the modern software engineer?	Why does computer hardware cost so much?	Why does software take a long time to finish?	Why does it cost so much to develop a piece of software?	Why can't software errors be removed from products prior to delivery?	0
21	Which question no longer concerns the modern software	Why does computer hardware cost so much?	Why does software take a long time to finish?	Why does it cost so much to develop a piece of software?	Why can't software errors be removed from products prior to delivery?	0

结果分析

登录正常

No.	3
测试功能	管理员/系统管理员登录
操作步骤	1) 登录在线自测子系统 2) 进入某教师的某课程 3) 进入某学生的某课程
操作数据	管理员/系统管理员账号
预期结果	显示所有教师及学生； 显示选择的教师所任教课程列表或学生课表。

实际结果

Teaching Service System

Logout(sysadmin)(System administrator) | Change Password | Information Management | Test Online Subsystem
Resource Sharing Subsystem | Course Arrangement Subsystem | Apply Class | Classroom Management | Course Selection
Score Management

[Home](#) » [OnlineTest Subsystem](#)

Teacher List

Displaying 1-10 of 13 result(s).

Teacher	Title	Department	
<input type="text"/>	<input type="text"/>	<input type="text"/>	
teacher			
t1			
3			
2012000001			
2012000002			
2012000003			
2012000004			
2012000005			
2012000006			
306		4	

Go to page: < Previous **1** 2 Next >

Student List

Displaying 1-10 of 23 result(s).

StudentID	Current Grade	Class	
<input type="text"/>	<input type="text"/>	<input type="text"/>	
student			
student2			
lalala			
student3	2009		
3333			
123123			
ssss			
zzzz			
sdfasdfsad			
3123456789	2000		

Go to page: < Previous **1** 2 3 Next >

Teaching Service System

Logout(sysadmin)(System administrator) | Change Password | Information Management | Test Online Subsystem
Resource Sharing Subsystem | Course Arrangement Subsystem | Apply Class | Classroom Management | Course Selection
Score Management

[Home](#) » [OnlineTest Subsystem](#) » [Courses List](#)

Course List

Displaying 1-4 of 4 result(s).

Course	Name	Introduction	
<input type="text"/>	<input type="text"/>	<input type="text"/>	
100000	OS		
200000	DataStructure		
300000	calculus		
400000	english		

结果分析

管理员登陆正常，前期选择操作正常

3.2 题库管理模块

3.2.1 功能介绍

账户条件：任教该课程的教师、管理员

可行操作：

5. 增加题目
6. 删除题目
7. 修改题目
8. 查询题库：输入题干或选项关键字模糊查询

3.2.2 测试用例

No.	4
测试功能	向题库添加选择题
操作步骤	1) 输入题目必选信息：题型、题干、答案 2) 点击添加按钮
操作数据	题型：选择题 题干：Which layout manager is used when the frame is resized the buttons's position in the Frame might be changed? A. BorderLayout B. FlowLayout C. CardLayout D. GridLayout 答案：B
预期结果	添加成功
















<div>实际结果</div>	<div><div><div>Teaching Service System</div><div><div>Logout(sysadmin)(System administrator)</div><div>Change Password</div><div>Information Management</div><div>Test Online Subsystem</div><div>Resource Sharing Subsystem</div><div>Course Arrangement Subsystem</div><div>Apply Class</div><div>Classroom Management</div><div>Course Selection</div><div>Score Management</div></div><div>Home » Online Test Subsystem » Course List » OS » Question Bank</div><div>Question Banks</div><div>Displaying 1-10 of 20 result(s).</div><div><div>Question: are you all right?</div><div>Type: Judge</div><div>Answer: T</div></div><div><div>Question: The earth is round.</div><div>Type: Judge</div><div>Answer: T</div></div><div><div>Question: Which question no longer concerns the modern software engineer?</div><div>Type: Selection</div><div>Selection A: Why does computer hardware cost so much?</div><div>Selection B: Why does software take a long time to finish?</div><div>Selection C: Why does it cost so much to develop a piece of software?</div><div>Selection D: Why can't software errors be removed from products prior to delivery?</div><div>Answer: A</div></div><div><div>Question: Software deteriorates rather than wears out because</div><div>Type: Selection</div><div>Selection A: Defects are more likely to arise after software has been used often</div><div>Selection B: Multiple change requests introduce errors in component interactions</div><div>Selection C: Software spare parts become harder to order</div><div>Selection D: Software suffers from exposure to hostile environments</div></div></div><div><div>Home » Online Test Subsystem » Course List » OS » Question Banks » Create</div><div>Create QuestionBank</div><div>Fields with * are required.</div><div>Question *</div><div>Which layout manager is used when the frame is resized the button</div><div>Type *</div><div>Selection</div><div>Selection A *</div><div>BorderLayout</div><div>Selection B *</div><div>FlowLayout</div><div>Selection C *</div><div>CarLayout</div><div>Selection D *</div><div>GridLayout</div><div>Answer *</div><div>B</div><div>Create</div></div><div><div>Teaching Service System</div><div><div>Logout(sysadmin)(System administrator)</div><div>Change Password</div><div>Information Management</div><div>Test Online Subsystem</div><div>Resource Sharing Subsystem</div><div>Course Arrangement Subsystem</div><div>Apply Class</div><div>Classroom Management</div><div>Course Selection</div><div>Score Management</div></div><div>Home » Online Test Subsystem » Course List » OS » Question Bank » 54</div><div>View QuestionBank #54</div><div><div>Question</div><div>Which layout manager is used when the frame is resized the buttons's position in the Frame might be changed?</div><div>Selection A</div><div>BorderLayout</div><div>Selection B</div><div>FlowLayout</div><div>Selection C</div><div>CarLayout</div><div>Selection D</div><div>GridLayout</div><div>Type</div><div>0</div><div>Answer</div><div>B</div></div><div><div>Operations</div><div>Modify</div><div>Delete</div><div>List Questions</div><div>Add Question</div><div>Manage Questions</div><div>Batch Add Questions</div></div></div></div>
<div>结果分析</div>	<div>选择题添加成功</div>

No.	5
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测试功能	向题库添加判断题														
操作步骤	1) 输入题目必选信息：题型、题干、答案 2) 点击添加按钮														
操作数据	题型：判断题 题干：The class File overrides equals() to return true if the contents and type of two separate objects match. 答案：T														
预期结果	添加成功														
实际结果	 <p>The screenshot shows the 'Teaching Service System' interface. The top navigation bar includes links for Logout, Change Password, Information, Resource Sharing Subsystem, Course Arrangement Subsystem, Apply, and Score Management. The breadcrumb trail is: Home » Online Test Subsystem » Course List » OS » Question Banks » Create. The main heading is 'Create QuestionBank'. Below it, a note says 'Fields with * are required.' The form contains: 'Question *' with the text 'The class File overrides equals() to return true if the contents and ty'; 'Type *' with a dropdown menu set to 'Judge'; 'Answer *' with a dropdown menu set to 'T'; and a 'Create' button. Below the form, another screenshot shows the 'View QuestionBank #55' page. This page has a similar navigation bar and breadcrumb trail: Home » Online Test Subsystem » Course List » OS » Question Bank » 55. It displays the question details and a table of selection options.</p> <table border="1"><thead><tr><th>Selection</th><th>Value</th></tr></thead><tbody><tr><td>Selection A</td><td>null</td></tr><tr><td>Selection B</td><td>null</td></tr><tr><td>Selection C</td><td>null</td></tr><tr><td>Selection D</td><td>null</td></tr><tr><td>Type</td><td>1</td></tr><tr><td>Answer</td><td>T</td></tr></tbody></table>	Selection	Value	Selection A	null	Selection B	null	Selection C	null	Selection D	null	Type	1	Answer	T
Selection	Value														
Selection A	null														
Selection B	null														
Selection C	null														
Selection D	null														
Type	1														
Answer	T														
结果分析	添加选择题正确														










No.

6

测试功能	向题库批量添加题库																																																
操作步骤	1) 选择文件 2) 点击添加按钮																																																
操作数据	question1.csv																																																
预期结果	添加成功																																																
实际结果	<div><div>Teaching Service System</div><div><div>Logout(sysadmin)(System administrator) Change Password Information Management Test Online Subsystem Resource Sharing Subsystem Course Arrangement Subsystem Apply Class Classroom Management Course Selection Score Management</div><div>Home » Online Test Subsystem » Course List » QS » Question Banks » batchCreate</div><div><div>Batch Create Info</div><div>Fields with * are required.</div><div>Input format: csv, UTF-8 encoded, with format "questionContent, type, selectionA, selectionB, selectionC, selectionD, answer" per line.</div><div>Questions Content File</div><div>选择文件 未选择文件</div><div>Submit</div></div><div><div>Operations</div><div>List Questions</div><div>Add Question</div><div>Manage Questions</div></div></div></div> <div><div>Teaching Service System</div><div><div>Logout(sysadmin)(System administrator) Change Password Information Management Test Online Subsystem Resource Sharing Subsystem Course Arrangement Subsystem Apply Class Classroom Management Course Selection Score Management</div><div>Home » Online Test Subsystem » Course List » QS » Question Banks » Manage</div><div><div>Manage Question Banks</div><div>You may optionally enter a comparison operator (<, <=, >, >=, <> or =) at the beginning of each of your search values to specify how the comparison should be done.</div><div>Advanced Search</div><div>Displaying 1-10 of 27 result(s).</div><table><tr><th>Question</th><th>Selection A</th><th>Selection B</th><th>Selection C</th><th>Selection D</th><th>Type</th><th>Answer</th><th></th></tr><tr><td>are you all right?</td><td>fill</td><td>fill</td><td>fill</td><td>fill</td><td>Judge</td><td>T</td><td>  </td></tr><tr><td>The earth is round.</td><td>null</td><td>null</td><td>null</td><td>null</td><td>Judge</td><td>T</td><td>  </td></tr><tr><td>Which question no longer concerns the modern software engineer?</td><td>Why does computer hardware cost so much?</td><td>Why does software take a long time to finish?</td><td>Why does it cost so much to develop a piece of software?</td><td>Why can't software errors be removed from products prior to delivery?</td><td>Selection A</td><td>A</td><td>  </td></tr><tr><td>Software deteriorates rather than wears out because</td><td>Defects are more likely to arise after software has been used often</td><td>Multiple change requests introduce errors in component interactions</td><td>Software spare parts become harder to order</td><td>Software suffers from exposure to hostile environments</td><td>Selection C</td><td>C</td><td>  </td></tr><tr><td>The nature of software applications can be characterized by three</td><td>complexity</td><td>content</td><td>determinacy</td><td>both B and C</td><td>Selection D</td><td>D</td><td>  </td></tr></table></div></div></div>	Question	Selection A	Selection B	Selection C	Selection D	Type	Answer		are you all right?	fill	fill	fill	fill	Judge	T	  	The earth is round.	null	null	null	null	Judge	T	  	Which question no longer concerns the modern software engineer?	Why does computer hardware cost so much?	Why does software take a long time to finish?	Why does it cost so much to develop a piece of software?	Why can't software errors be removed from products prior to delivery?	Selection A	A	  	Software deteriorates rather than wears out because	Defects are more likely to arise after software has been used often	Multiple change requests introduce errors in component interactions	Software spare parts become harder to order	Software suffers from exposure to hostile environments	Selection C	C	  	The nature of software applications can be characterized by three	complexity	content	determinacy	both B and C	Selection D	D	  
Question	Selection A	Selection B	Selection C	Selection D	Type	Answer																																											
are you all right?	fill	fill	fill	fill	Judge	T	  																																										
The earth is round.	null	null	null	null	Judge	T	  																																										
Which question no longer concerns the modern software engineer?	Why does computer hardware cost so much?	Why does software take a long time to finish?	Why does it cost so much to develop a piece of software?	Why can't software errors be removed from products prior to delivery?	Selection A	A	  																																										
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The nature of software applications can be characterized by three	complexity	content	determinacy	both B and C	Selection D	D	  																																										
结果分析	批量添加成功																																																



No.	7
测试功能	添加题目的信息完全度检测
操作步骤	1) 输入题目，题干信息为空 2) 点击添加按钮
操作数据	题型：判断题 题干：

	答案：T
预期结果	提示题干信息不能为空
实际结果	<div><h3>Create QuestionBank</h3><p>Fields with * are required.</p><div>Please fix the following input errors:<ul style="list-style-type: none">Question cannot be blank.</div><div>Question *<div></div><p>Question cannot be blank.</p>Type *<div>Judge</div>Answer *<div>T</div><div>Create</div></div></div>
结果分析	信息完全度正确

No.	8																																
测试功能	删除单个题目																																
操作步骤	1) 浏览题库 2) 选中题目，点击删除按钮																																
操作数据	对第一题执行删除操作																																
预期结果	该题删除，试卷及学生自测数据库中该题目信息全部删除																																
实际结果	<div><p>Home » Online Test Subsystem » Course List » OS » Question Banks » Manage</p><h3>Manage Question Banks</h3><p>You may optionally enter a comparison operator (<, <=, >, >=, <> or =) at the beginning of each of your search values to specify how the comparison should be done.</p><p>Advanced Search</p><p>Displaying 1-10 of 27 result(s).</p><table><tr><th>Question</th><th>Selection A</th><th>Selection B</th><th>Selection C</th><th>Selection D</th><th>Type</th><th>Answer</th><th></th></tr><tr><td>are you all right?</td><td>fill</td><td>fill</td><td>fill</td><td>fill</td><td>Judge</td><td>T</td><td>  </td></tr><tr><td>The earth is round.</td><td>null</td><td>null</td><td>null</td><td>null</td><td>Judge</td><td>T</td><td>  </td></tr><tr><td>Which question no longer concern the modern</td><td>Why does computer</td><td>Why does software take a</td><td>Why does it cost so much to develop a</td><td>Why can't software errors be removed from Collection A</td><td></td><td></td><td>  </td></tr></table><div><p>localhost 上的网页显示：</p><p>Are you sure you want to delete this item?</p><div><div>确定</div><div>取消</div></div></div></div>	Question	Selection A	Selection B	Selection C	Selection D	Type	Answer		are you all right?	fill	fill	fill	fill	Judge	T	  	The earth is round.	null	null	null	null	Judge	T	  	Which question no longer concern the modern	Why does computer	Why does software take a	Why does it cost so much to develop a	Why can't software errors be removed from Collection A			  
Question	Selection A	Selection B	Selection C	Selection D	Type	Answer																											
are you all right?	fill	fill	fill	fill	Judge	T	  																										
The earth is round.	null	null	null	null	Judge	T	  																										
Which question no longer concern the modern	Why does computer	Why does software take a	Why does it cost so much to develop a	Why can't software errors be removed from Collection A			  																										







Advanced Search










Displaying 1-10 of 26 result(s).

Question	Selection A	Selection B	Selection C	Selection D	Type	Answer	
The earth is round.	null	null	null	null	Judge	T	 
Which question no longer	Why does computer	Why does software take a	Why does it cost so much	Why can't software errors			

结果分析

删除成功

No.	9																								
测试功能	修改题目																								
操作步骤	1) 浏览题库 2) 选中第 1 题，执行修改操作																								
操作数据	原始第 1 题为： 题干：The earth is round. 答案：T 修改为： 题干：The earth is flat. 答案：F																								
预期结果	更新题库中该题信息																								
实际结果	<div><div>Manage Question Banks</div><div>You may optionally enter a comparison operator (<, <=, >, >=, <> or =) at the beginning of each of your search values to specify how the comparison should be done.</div><div>Advanced Search</div><div>Displaying 1-10 of 26 result(s).</div><table><tr><th>Question</th><th>Selection A</th><th>Selection B</th><th>Selection C</th><th>Selection D</th><th>Type</th><th>Answer</th><th></th></tr><tr><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td></td></tr><tr><td>The earth is round.</td><td>null</td><td>null</td><td>null</td><td>null</td><td>Judge</td><td>T</td><td> </td></tr></table></div>	Question	Selection A	Selection B	Selection C	Selection D	Type	Answer		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		The earth is round.	null	null	null	null	Judge	T	 
Question	Selection A	Selection B	Selection C	Selection D	Type	Answer																			
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>																			
The earth is round.	null	null	null	null	Judge	T	 																		

操作步骤	1) 输入关键字 2) 点击查询按钮																								
操作数据	关键字：Layout																								
预期结果	显示包含 Layout 的所有题目																								
实际结果	<div><div>Manage Question Banks</div><div><div>You may optionally enter a comparison operator (<, <=, >, >=, <> or =) at the beginning of each of your search values to specify how the comparison should be done.</div><div>Advanced Search</div><div>Displaying 1-1 of 1 result(s).</div><table><tr><th>Question</th><th>Selection A</th><th>Selection B</th><th>Selection C</th><th>Selection D</th><th>Type</th><th>Answer</th><th></th></tr><tr><td>layout</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Which layout manager is used when the frame is resized the buttons's position in the Frame might be changed?</td><td>BorderLayout</td><td>FlowLayout</td><td>CardLayout</td><td>GridLayout</td><td>Selection</td><td>B</td><td>  </td></tr></table></div></div>	Question	Selection A	Selection B	Selection C	Selection D	Type	Answer		layout								Which layout manager is used when the frame is resized the buttons's position in the Frame might be changed?	BorderLayout	FlowLayout	CardLayout	GridLayout	Selection	B	  
Question	Selection A	Selection B	Selection C	Selection D	Type	Answer																			
layout																									
Which layout manager is used when the frame is resized the buttons's position in the Frame might be changed?	BorderLayout	FlowLayout	CardLayout	GridLayout	Selection	B	  																		
结果分析	关键字模糊查询正确																								

No.	11																
测试功能	输入题干关键字查询题目																
操作步骤	1) 输入关键字 2) 点击查询按钮																
操作数据	关键字：lfjalj																
预期结果	无匹配题目显示																
实际结果	<div><div>Manage Question Banks</div><div><div>You may optionally enter a comparison operator (<, <=, >, >=, <> or =) at the beginning of each of your search values to specify how the comparison should be done.</div><div>Advanced Search</div><div><table><tr><th>Question</th><th>Selection A</th><th>Selection B</th><th>Selection C</th><th>Selection D</th><th>Type</th><th>Answer</th><th></th></tr><tr><td>lfjalj</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table><div>No results found.</div></div></div></div>	Question	Selection A	Selection B	Selection C	Selection D	Type	Answer		lfjalj							
Question	Selection A	Selection B	Selection C	Selection D	Type	Answer											
lfjalj																	
结果分析	查询正确																

3.3 试卷管理模块

3.3.1 功能介绍

账户条件：任教该课的教师、管理员

可行操作：

- 1. 查看试卷
- 2. 手动生成试卷
- 3. 修改未发布试卷
- 4. 删除试卷
- 5. 自动生成试卷

3.3.2 测试用例

No.	12																																																	
测试功能	查看试卷																																																	
操作步骤	1) 点击某份试卷																																																	
预期结果	显示该试卷所有题目列表																																																	
实际结果	<div><div>Logout(sysadmin)(System administrator) Change Password Information Management Test Online Subsystem Resource Sharing Subsystem Course Arrangement Subsystem Apply Class Classroom Management Course Selection Score Management</div><div>Home » Online Test Subsystem » Course List » OS » 7</div><div>View Paper</div><div><div>Teacher: Cai Deng</div><div>Course: OS</div><div>Is Publish: 1</div><div>Timelimit: 00:09:00</div></div><div>Displaying 1-7 of 7 result(s).</div><table><tr><th>id</th><th>question</th><th>selection_a</th><th>selection_b</th><th>selection_c</th><th>selection_d</th><th>type</th></tr><tr><td>11</td><td>The earth is flat.</td><td>null</td><td>null</td><td>null</td><td>null</td><td>1</td></tr><tr><td>20</td><td>The nature of software applications can be characterized by their information</td><td>complexity</td><td>content</td><td>determinacy</td><td>both B and C</td><td>0</td></tr><tr><td>28</td><td>Which question no longer concerns the modern software engineer?</td><td>Why does computer hardware cost so much?</td><td>Why does software take a long time to finish?</td><td>Why does it cost so much to develop a piece of software?</td><td>Why can't software errors be removed from products prior to delivery?</td><td>0</td></tr><tr><td>15</td><td>The nature of software applications can be characterized by their information</td><td>complexity</td><td>content</td><td>determinacy</td><td>both B and C</td><td>0</td></tr><tr><td>39</td><td>Modern software applications are so complex that it is hard to develop mutually exclusive category names.</td><td>null</td><td>null</td><td>null</td><td>null</td><td>1</td></tr><tr><td>13</td><td>Which question no longer concerns the modern software engineer?</td><td>Why does computer hardware cost a long time to</td><td>Why does software take a long time to</td><td>Why does it cost so much to develop a piece of</td><td>Why can't software errors be removed from products prior to</td><td>0</td></tr></table></div>	id	question	selection_a	selection_b	selection_c	selection_d	type	11	The earth is flat.	null	null	null	null	1	20	The nature of software applications can be characterized by their information	complexity	content	determinacy	both B and C	0	28	Which question no longer concerns the modern software engineer?	Why does computer hardware cost so much?	Why does software take a long time to finish?	Why does it cost so much to develop a piece of software?	Why can't software errors be removed from products prior to delivery?	0	15	The nature of software applications can be characterized by their information	complexity	content	determinacy	both B and C	0	39	Modern software applications are so complex that it is hard to develop mutually exclusive category names.	null	null	null	null	1	13	Which question no longer concerns the modern software engineer?	Why does computer hardware cost a long time to	Why does software take a long time to	Why does it cost so much to develop a piece of	Why can't software errors be removed from products prior to	0
id	question	selection_a	selection_b	selection_c	selection_d	type																																												
11	The earth is flat.	null	null	null	null	1																																												
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15	The nature of software applications can be characterized by their information	complexity	content	determinacy	both B and C	0																																												
39	Modern software applications are so complex that it is hard to develop mutually exclusive category names.	null	null	null	null	1																																												
13	Which question no longer concerns the modern software engineer?	Why does computer hardware cost a long time to	Why does software take a long time to	Why does it cost so much to develop a piece of	Why can't software errors be removed from products prior to	0																																												
结果分析	显示正确																																																	

No.	13
测试功能	手动生成试卷
操作步骤	1) 选择手动生成试卷 2) 选择题目，分配分值 3) 点击确认生成

预期结果	显示该教师该课程的所有题目列表； 提示生成成功并显示试卷。(此时试卷处于未发布状态)																																																						
实际结果	<div><div>Teaching Service System</div><div><div>Logout(sysadmin)(System administrator) Change Password Information Management</div><div>Resource Sharing Subsystem Course Arrangement Subsystem Apply Class </div><div>Score Management</div></div><div>Home » Online Test Subsystem » Course List » OS » Generate Paper</div><div>Create Paper</div><div>Fields with * are required.</div><div><div>Timelimit *</div><div><div></div><div><div>Choose Time</div><div><div>Time0:0:0</div><div><div>Hour</div><div><div>00</div><div>01</div></div><div><div>Minute</div><div><div></div><div></div></div></div><div><div>Now</div><div>Done</div></div></div></div><div>Copyright © 2012 by Red Group All Rights Reserved.</div></div><div>Home » Online Test Subsystem » Course List » OS » 29 » Modify</div><div>Manage Questions in Paper</div><div>You may optionally enter a comparison operator (<, <=, >, >=, <> or =) at the beginning of each of your search values to specify how the comparison should be done.</div><div>Advanced Search</div><div>Displaying 1-1 of 1 result(s).</div><table><tr><th>id</th><th>question</th><th>selection_a</th><th>selection_b</th><th>selection_c</th><th>selection_d</th><th>type</th><th>answer</th><th></th></tr><tr><td>11</td><td>The earth is flat.</td><td>null</td><td>null</td><td>null</td><td>null</td><td>1</td><td>F</td><td></td></tr></table><div>Select the following questions to be added:</div><div>Displaying 1-10 of 25 result(s).</div><table><tr><th>ID</th><th>Question</th><th>Selection A</th><th>Selection B</th><th>Selection C</th><th>Selection D</th><th>Type</th><th>Answer</th><th></th></tr><tr><td>13</td><td>Which question no longer concerns the modern software engineer?</td><td>Why does computer hardware cost so much?</td><td>Why does software take a long time to finish?</td><td>Why does it cost so much to develop a piece of software?</td><td>Why can't software errors be removed from products prior to delivery?</td><td>0</td><td>A</td><td><input type="checkbox"/></td></tr><tr><td>14</td><td>Software deteriorates rather than wears out because</td><td>Defects are more likely to arise after software has been used often</td><td>Multiple change requests introduce errors in component interactions</td><td>Software spare parts become harder to order</td><td>Software suffers from exposure to hostile environments</td><td>0</td><td>C</td><td><input type="checkbox"/></td></tr><tr><td>15</td><td>The nature of software applications can be characterized by their information</td><td>complexity</td><td>content</td><td>determinacy</td><td>both B and C</td><td>0</td><td>D</td><td><input type="checkbox"/></td></tr></table></div></div></div>	id	question	selection_a	selection_b	selection_c	selection_d	type	answer		11	The earth is flat.	null	null	null	null	1	F		ID	Question	Selection A	Selection B	Selection C	Selection D	Type	Answer		13	Which question no longer concerns the modern software engineer?	Why does computer hardware cost so much?	Why does software take a long time to finish?	Why does it cost so much to develop a piece of software?	Why can't software errors be removed from products prior to delivery?	0	A	<input type="checkbox"/>	14	Software deteriorates rather than wears out because	Defects are more likely to arise after software has been used often	Multiple change requests introduce errors in component interactions	Software spare parts become harder to order	Software suffers from exposure to hostile environments	0	C	<input type="checkbox"/>	15	The nature of software applications can be characterized by their information	complexity	content	determinacy	both B and C	0	D	<input type="checkbox"/>
id	question	selection_a	selection_b	selection_c	selection_d	type	answer																																																
11	The earth is flat.	null	null	null	null	1	F																																																
ID	Question	Selection A	Selection B	Selection C	Selection D	Type	Answer																																																
13	Which question no longer concerns the modern software engineer?	Why does computer hardware cost so much?	Why does software take a long time to finish?	Why does it cost so much to develop a piece of software?	Why can't software errors be removed from products prior to delivery?	0	A	<input type="checkbox"/>																																															
14	Software deteriorates rather than wears out because	Defects are more likely to arise after software has been used often	Multiple change requests introduce errors in component interactions	Software spare parts become harder to order	Software suffers from exposure to hostile environments	0	C	<input type="checkbox"/>																																															
15	The nature of software applications can be characterized by their information	complexity	content	determinacy	both B and C	0	D	<input type="checkbox"/>																																															
结果分析	手动生成试卷正常，删除题目出错																																																						
错误原因	按键 action 传递参数错误，已经修正																																																						
修正结果	手动生成试卷正常，能以友好的界面进行修改试卷																																																						

No.	14
测试功能	自动生成试卷

操作步骤	1) 选择自动生成试卷 2) 输入题目数量
操作数据	题数：5
预期结果	提示生成成功并显示试卷。(此时试卷处于未发布状态)
实际结果	 
结果分析	自动生成正确

No.	15
测试功能	发布试卷
操作步骤	1) 选择试卷 2) 点击发布
预期结果	提示发布成功。(此时试卷处于发布状态)

实际结果	<div><div>Home » Online Test Subsystem » Course List » OS » Update Paper Information</div><div><h2>Update Paper Information</h2><p>Fields with * are required.</p><div><div>Is Publish</div><div>False ▾</div></div><div><div>Timelimit *</div><div>00:09:00</div></div><div>Save</div></div></div>
结果分析	发布正确

No.	16
测试功能	删除一份试卷
操作步骤	1) 浏览试卷库 2) 选中某份试卷，点击删除按钮
操作数据	对第 1 份试卷执行删除操作
预期结果	该试卷删除，学生自测数据库中该试卷作答信息全部删除
实际结果	
结果分析	

3.4 学生在线自测模块

3.4.1 功能介绍

账户条件：选上该课程的学生

可行操作：

1. 计时在线做试卷
2. 提交试卷

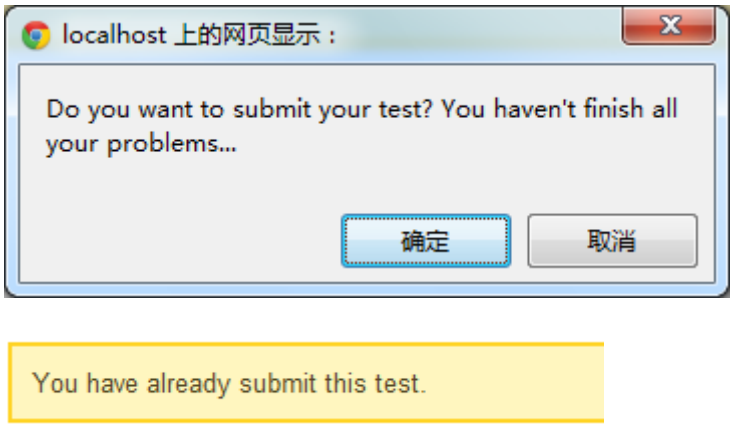
3.4.2 测试用例

No.	17
测试功能	计时答题并提交
操作步骤	1) 浏览试卷库 2) 选中某份试卷，点击开始作答按钮 3) 完成后提交
预期结果	显示试卷，完成后提交显示分数
实际结果	
结果分析	显示了试卷答案
修正结果	

	<div><div>Home » Online Test Subsystem » Test Recordings » Attend Test</div><div>Attending Test</div><div>0:8:58 remaining</div><div><div>Operations</div><div>Submit this test</div><div>Back to other papers</div></div><div><div>Fields with * are required.</div><div>Question: The earth is flat.</div><div>Select Your Answer</div><div><input checked="" type="radio"/> true</div><div><input type="radio"/> false</div></div><div>Go to page: < Previous 1 2 3 4 5 Next ></div><div>Save</div><div>显示正确</div></div>
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No.	18
测试功能	计时答题，未提交前关闭浏览器
操作步骤	1) 浏览试卷库 2) 选中某份试卷，点击开始作答按钮 3) 未完成前关闭浏览器 4) 重新登录
预期结果	显示试卷及学生上次作答情况
实际结果	<div><div>Home » Online Test Subsystem » Test Recordings » Attend Test</div><div>Attending Test</div><div>0:8:58 remaining</div><div><div>Operations</div><div>Submit this test</div><div>Back to other papers</div></div><div><div>Fields with * are required.</div><div>Question: The earth is flat.</div><div>Select Your Answer</div><div><input checked="" type="radio"/> true</div><div><input type="radio"/> false</div></div><div>Go to page: < Previous 1 2 3 4 5 Next ></div><div>Save</div></div>
结果分析	保存用户答题信息正确

No.	19
测试功能	计时答题，未完成点击提交
操作步骤	1) 浏览试卷库 2) 选中某份试卷，点击开始作答按钮 3) 未完成点击提交按钮(时间未到) 4) 坚持 submit

预期结果	提示“时间未到，题目未完成”，但用户坚持则 submit
实际结果	
结果分析	提示正确

No.	20
测试功能	计时答题，超时
操作步骤	1) 浏览试卷库 2) 选中某份试卷，点击开始作答按钮 3) 规定时间内未完成试卷
操作数据	题目量为 5，限时 2 分钟
预期结果	提示“时间已到”，以及其得分
实际结果	
结果分析	

3.5 统计分析模块

3.5.1 功能介绍

账户条件：任教该课程的教师或正在上课的学生或管理员
可行操作：

1. 教师或管理员查看某份试卷各题答题情况分布
2. 教师或管理员查看题库各题答题情况分布
3. 学生查看历史成绩

3.5.2 测试用例

No.	21																																																																																		
测试功能	查看某份试卷各题答题情况																																																																																		
操作步骤	1) 浏览试卷库 2) 选中某份试卷，查看各题答题情况																																																																																		
预期结果	依次显示各题的 A,B,C,D 或 T,F 选项的选择率																																																																																		
实际结果	<div><div>Home » Online Test Subsystem » Course List » OS » Statistics Analysis » Show Papers</div><div>Show papers</div><div><div>Displaying 1-10 of 10 result(s).</div><table><tr><th>ID</th><th>Teacher</th><th>Course</th><th>Is Publish</th><th>Timelimit</th><th></th></tr><tr><td>7</td><td>3</td><td>1</td><td>1</td><td>00:09:00</td><td></td></tr><tr><td>8</td><td>3</td><td>1</td><td>0</td><td>00:00:01</td><td></td></tr><tr><td>9</td><td>3</td><td>1</td><td>1</td><td>00:22:22</td><td></td></tr><tr><td>15</td><td>3</td><td>1</td><td>0</td><td>01:00:00</td><td></td></tr><tr><td>17</td><td>3</td><td>1</td><td>0</td><td>01:00:00</td><td></td></tr><tr><td>20</td><td>3</td><td>1</td><td>1</td><td>00:14:00</td><td></td></tr><tr><td>21</td><td>3</td><td>1</td><td>0</td><td>00:09:00</td><td></td></tr><tr><td>28</td><td>3</td><td>1</td><td>1</td><td>00:26:00</td><td></td></tr><tr><td>29</td><td>3</td><td>1</td><td>0</td><td>00:20:00</td><td></td></tr><tr><td>30</td><td>3</td><td>1</td><td>1</td><td>00:09:00</td><td></td></tr></table></div><div><div>Problem #11</div><table><tr><td>Pro</td><td>11</td></tr><tr><td>Done</td><td>5</td></tr><tr><td>A</td><td>0</td></tr><tr><td>B</td><td>0</td></tr><tr><td>C</td><td>0</td></tr><tr><td>D</td><td>0</td></tr><tr><td>Answer</td><td>F</td></tr><tr><td>Correct Rate</td><td>0%</td></tr></table><div><div>Problem No.11</div><div> </div><div><div>number of choosing this answer</div><div><div>6</div><div>5</div><div>4</div><div>3</div><div>2</div><div>1</div><div>0</div></div><div><div>A(T)</div><div>B(F)</div><div>C</div><div>D</div><div>give up</div></div><div>5</div></div></div></div></div>	ID	Teacher	Course	Is Publish	Timelimit		7	3	1	1	00:09:00		8	3	1	0	00:00:01		9	3	1	1	00:22:22		15	3	1	0	01:00:00		17	3	1	0	01:00:00		20	3	1	1	00:14:00		21	3	1	0	00:09:00		28	3	1	1	00:26:00		29	3	1	0	00:20:00		30	3	1	1	00:09:00		Pro	11	Done	5	A	0	B	0	C	0	D	0	Answer	F	Correct Rate	0%
ID	Teacher	Course	Is Publish	Timelimit																																																																															
7	3	1	1	00:09:00																																																																															
8	3	1	0	00:00:01																																																																															
9	3	1	1	00:22:22																																																																															
15	3	1	0	01:00:00																																																																															
17	3	1	0	01:00:00																																																																															
20	3	1	1	00:14:00																																																																															
21	3	1	0	00:09:00																																																																															
28	3	1	1	00:26:00																																																																															
29	3	1	0	00:20:00																																																																															
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B	0																																																																																		
C	0																																																																																		
D	0																																																																																		
Answer	F																																																																																		
Correct Rate	0%																																																																																		
结果分析	显示正确																																																																																		

No.	22																		
测试功能	查看某份试卷得分情况																		
操作步骤	1) 浏览试卷库 2) 选中某份试卷，查看总体得分情况																		
预期结果	显示统计图表示各分数区间的比例																		
实际结果	<div>Show Problems</div> <div><div>分数分布情况</div><table><caption>Displaying 1-1 of 1 result(s).</caption><tr><th>id</th><th>question</th><th>selection_a</th><th>selection_b</th><th>selection_c</th><th>selection_d</th><th>type</th><th>answer</th><th></th></tr><tr><td>11</td><td>The earth is flat.</td><td>null</td><td>null</td><td>null</td><td>null</td><td>1</td><td>F</td><td></td></tr></table></div>	id	question	selection_a	selection_b	selection_c	selection_d	type	answer		11	The earth is flat.	null	null	null	null	1	F	
id	question	selection_a	selection_b	selection_c	selection_d	type	answer												
11	The earth is flat.	null	null	null	null	1	F												
结果分析	显示正确																		

No.	23
测试功能	查看题库各题答题情况
操作步骤	1) 浏览题库 2) 查看答题情况
预期结果	依次显示 A,B,C,D 或 T,F 选项的选择率，每题边显示正确率
实际结果	

Home » [Online Test Subsystem](#) » [Course List](#) » [OS](#) » [Statistics Analysis](#) » Show problems

Show Problems

Displaying 1-10 of 64 result(s).

id	question	selection_a	selection_b	selection_c	selection_d	type	answer	
31	Software is a product and can be manufactured using the same technologies used for other engineering artifacts.	null	null	null	null	1	F	
11	The earth is flat.	null	null	null	null	1	F	
11	The earth is flat.	null	null	null	null	1	F	
21	Which question no longer concerns the modern software engineer?	Why does computer hardware cost so much?	Why does software take a long time to finish?	Why does it cost so much to develop a piece of software?	Why can't software errors be removed from products prior to delivery?	0	A	
23	Software deteriorates rather than wears out because	Defects are more likely to arise after software has been used often	Multiple change requests introduce errors in component interactions	Software spare parts become harder to order	Software suffers from exposure to hostile environments	0	C	

Problem #31

Pro	31
Done	3
A	1
B	2
C	0
D	0
Answer	F
Correct Rate	66.67%

Problem No.31

Option	Number of choosing this answer
A(T)	1
B(F)	2
C	0
D	0
give up	0

结果分析

显示正确

No.	24
测试功能	学生查看某课程历史试卷成绩
操作步骤	1) 浏览某课程试卷 2) 查看历史成绩
预期结果	显示该课程所做历史试卷得分的折线图

实际结果	<div><div>Show students</div><div><div>Your history of all your papers in OS</div><div><div></div><div></div></div><div><div>Scores</div><div>100</div><div>80</div><div>60</div><div>40</div><div>20</div><div>0</div></div><div><div>9</div><div>28</div></div><div>Highcharts.com</div></div></div>
结果分析	显示正确

4 边界测试

4.1 题库管理模块

4.1.1 输入输出要求

添加/修改题目：题干不超过 500 字符；

查询题目：题号>0.

4.1.2 测试用例

No.	25
测试功能	向题库添加选择题(题干超过 500 字符)
操作步骤	1) 输入题目必选信息：题型、题干、答案 2) 点击添加按钮
操作数据	题型：选择题 题干：Which layout manager is used when the frame is resized the buttons’s position in the Frame might be changed? Which layout manager is used when the frame is resized the buttons’s position in the Frame might be changed?Which layout manager is used when the frame is resized the buttons’s position in the Frame might be changed? Which layout manager is used when the frame is resized the buttons’s position in the Frame might be changed? Which layout manager is used when the frame is resized the buttons’s position in the Frame might be changed? Which layout manager is used when the frame is resized the buttons’s position in the Frame might be changed? 答案：B
预期结果	提示字数超过上限

实际结果	<div>Question *</div> <div>Which layout manager is used when the frame is resized the button</div>
结果分析	输入框默认最大 500 字符

4.2 试卷管理模块

4.2.1 输入输出要求

自动生成试卷：输入题数(1-100)；

手工生成试卷：设置试卷中各题分值；输入时限(0-2h)。

4.2.2 测试用例

No.	26
测试功能	自动生成试卷
操作步骤	1) 输入题数 2) 点击自动生成按钮
操作数据	题数： -1
预期结果	提示请输入正数
实际结果	默认不添加
结果分析	和预期有出入，但操作结果相同——不添加

No.	27
测试功能	自动生成试卷
操作步骤	1) 输入题数 2) 点击自动生成按钮
操作数据	题数： 1.1
预期结果	提示题数为整数

实际结果	添加了 2 道题
结果分析	系统默认将小数整数化以纠正用户的输入错误

No.	28
测试功能	手动生成试卷
操作步骤	1) 选中题库中的题目 2) 设置时限 3) 为各题设置分值
操作数据	分值正常 时限: -1
预期结果	提示时限为 1-60 的整数
实际结果	改为控件实现, 不会出现负数

4.3 学生在线自测模块

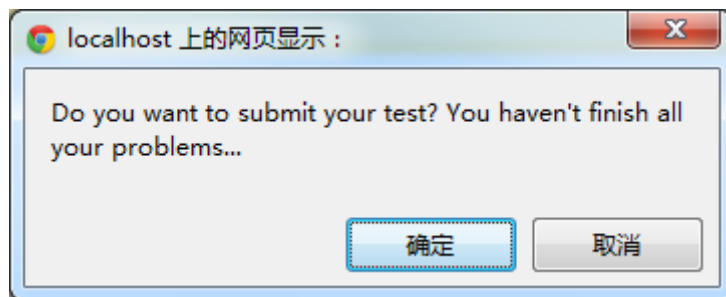
4.3.1 输入输出要求

提交试卷: 必须所有题目都已经完成(不包括时间已到的情况)。

4.3.2 测试用例

No.	29
测试功能	学生提交试卷
操作步骤	1) 在线答题 2) 还有 1 题未完成时点击提交按钮
预期结果	提示“还有题目未完成”

实际结果



5 压力测试

5.1 测试范围

5.1.1 用户量压力测试

学生在线自测要能承受至少 100 名学生同时在线自测的压力。

5.1.2 数据量压力测试

在一个系统内，仅有一个用户登录使用相同的操作，对不同的数据量进行测试。记录下数据量和对应的响应时间。

我们需要保证在数据量小于 10W 以内都能在 1s 内快速反应。

5.2 测试工具

5.2.1 LOADRUNNER 介绍

LoadRunner 是一种预测系统行为和性能的负载测试工具。通过模拟上千万用户实施并发负载及实时性能检测来确认和查找问题，能够对整个企业架构进行测试。通过使用 Loadrunner，企业能够最大限度的缩短测试时间，优化性能和加速应用系统的发布周期。

LoadRunner 能支持广范的协议和技术，功能比较强大，可以为特殊环境提供特殊的解决方案。

5.2.2 LOADRUNNER 特征

- 1) 轻松创建虚拟用户；
- 2) 创建真实的负载；
- 3) 定位性能问题；
- 4) 分析结果以精确定位问题所在；
- 5) 重复测试保证系统发布的高性能；
- 6) 支持 Enterprise Java Beans 的测试；
- 7) 支持无线应用协议；
- 8) 支持 Media Stream 应用。

5.3 测试方法

5.3.1 LOADRUNNER 组件

1) Virtual User Generator

在测试环境中，LoadRunner 在物理计算机上使用 Vuser 代替实际用户。Vuser 以一种可重复、可预测的方式模拟典型用户的操作，对系统施加负载。

LoadRunner Virtual User Generator (VuGen) 以“录制-回放”的方式工作。当您在应用程序中执行业务流程步骤时，VuGen 会将您的操作录制到自动化脚本中，并将其作为负载测试的基础。

2) Controller

用来布置测试场景、执行测试场景。

3) Analysis

用来对测试结果进行分析。

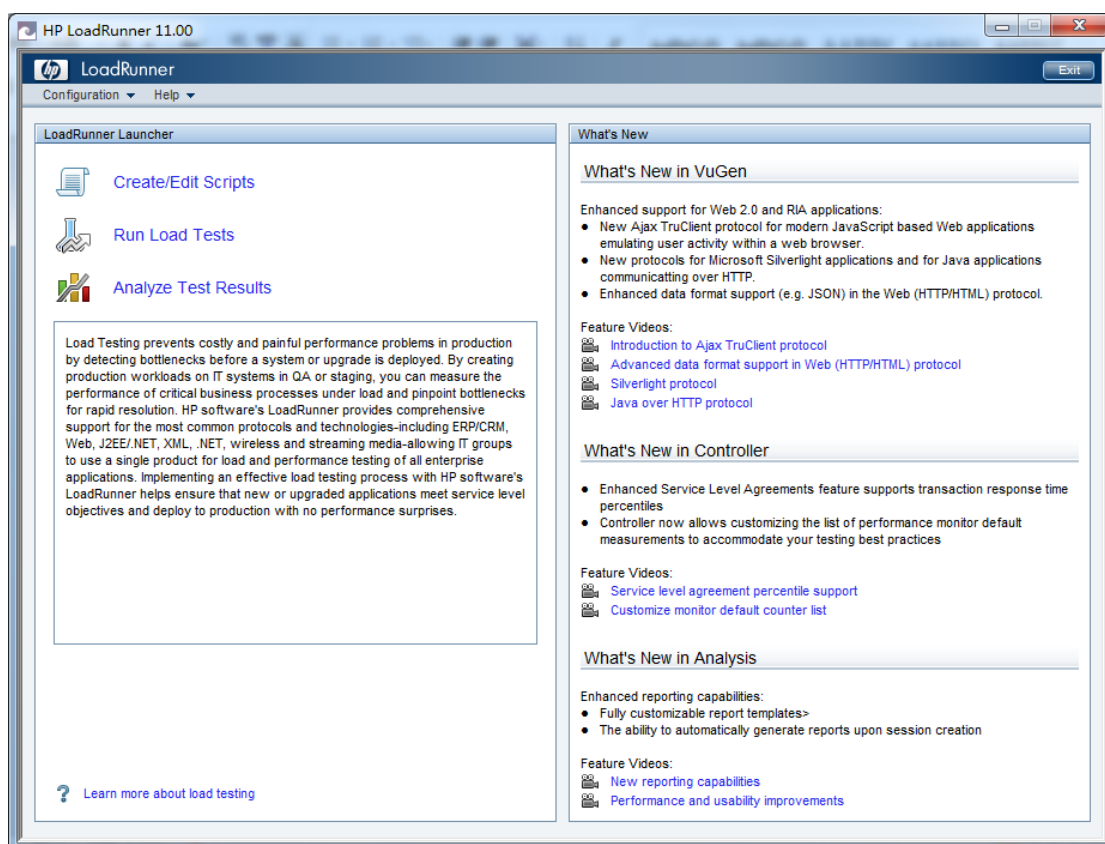
5.3.2 LOADRUNNER 操作步骤

- 1) 打开 Controller 的“运行”视图：选择屏幕底部的运行选项卡；
- 2) 开始场景：单击开始场景按钮，或者选择场景 > 开始以开始运行测试；
- 3) 检查性能图。：“运行”选项卡显示下列默认的联机图：

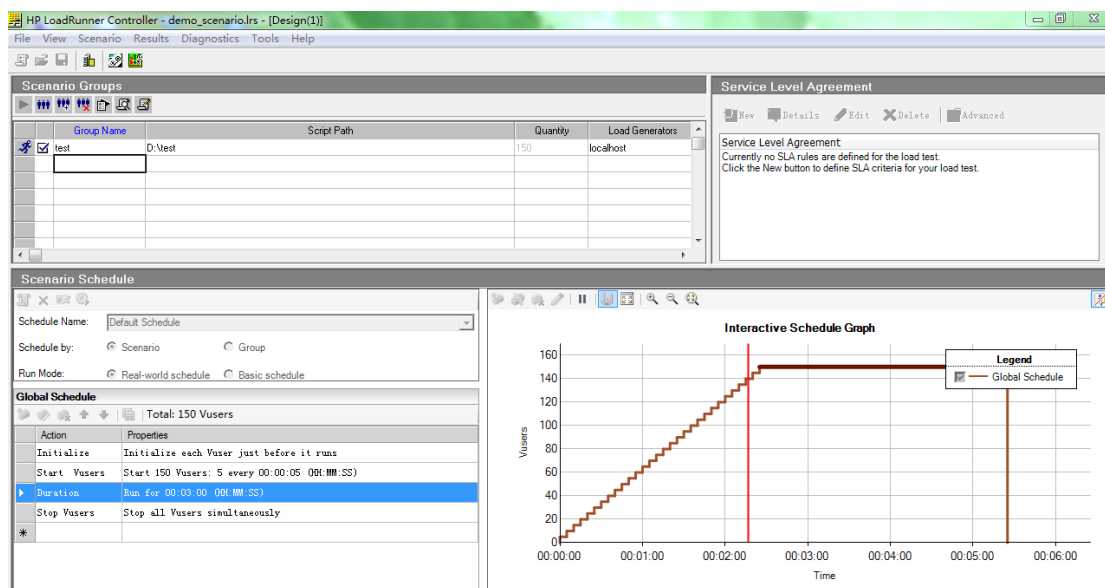
- i. “正在运行 Vuser——整个场景”图。显示在指定时间运行的 Vuser 数。
 - ii. “事务响应时间——整个场景”图。显示完成每个事务所用的时间。
 - iii. “每秒点击次数——整个场景”图。显示场景运行期间 Vuser 每秒向 Web 服务器提交的点击次数（HTTP 请求数）。
 - iv. “Windows 资源”图。显示场景运行期间评测的 Windows 资源。
- 4) 突出显示单个测量值：双击“Windows 资源”图将其放大；
 - 5) 查看吞吐量信息：选择可用图树中的吞吐量图，将其拖放到图查看区域；
 - 6) 查看测试状态：“场景状态”窗格显示场景的整体状况；
 - 7) 查看 Vuser 操作的详细信息：单击“场景状态”窗格中通过的事务，查看事务的详细信息列表。

5.3.3 LOADRUNNER 操作记录

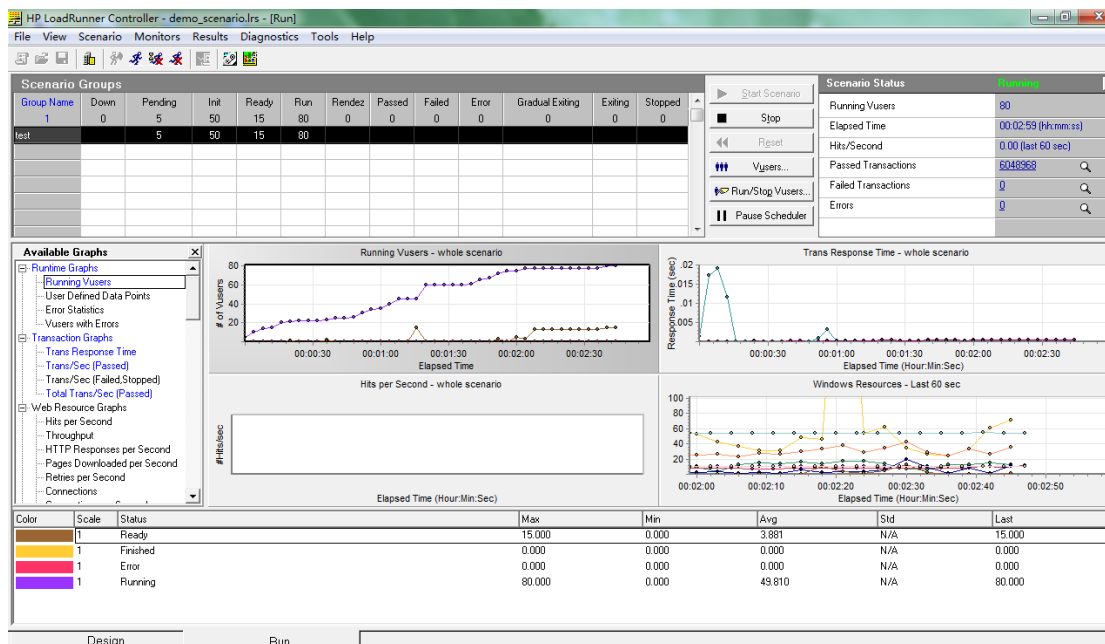
1) 主界面：



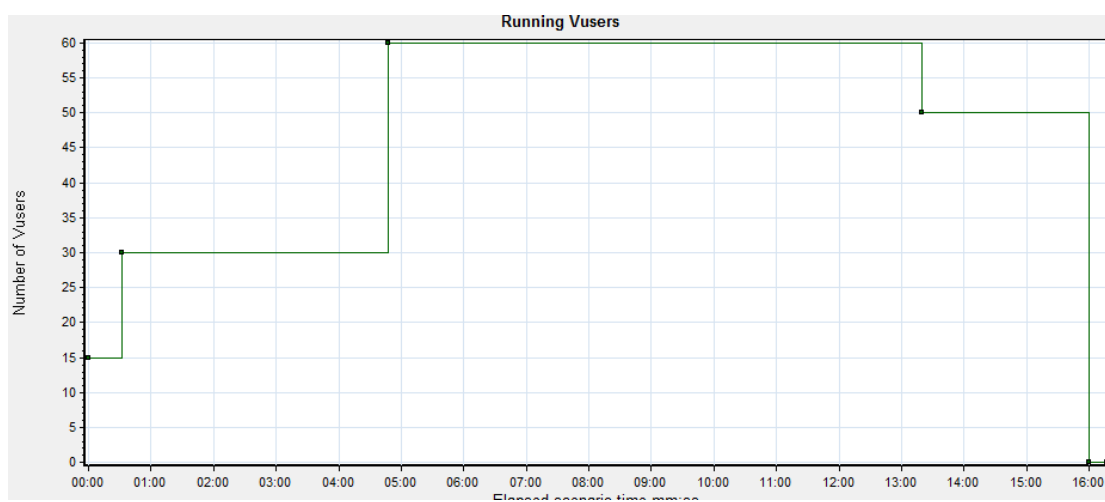
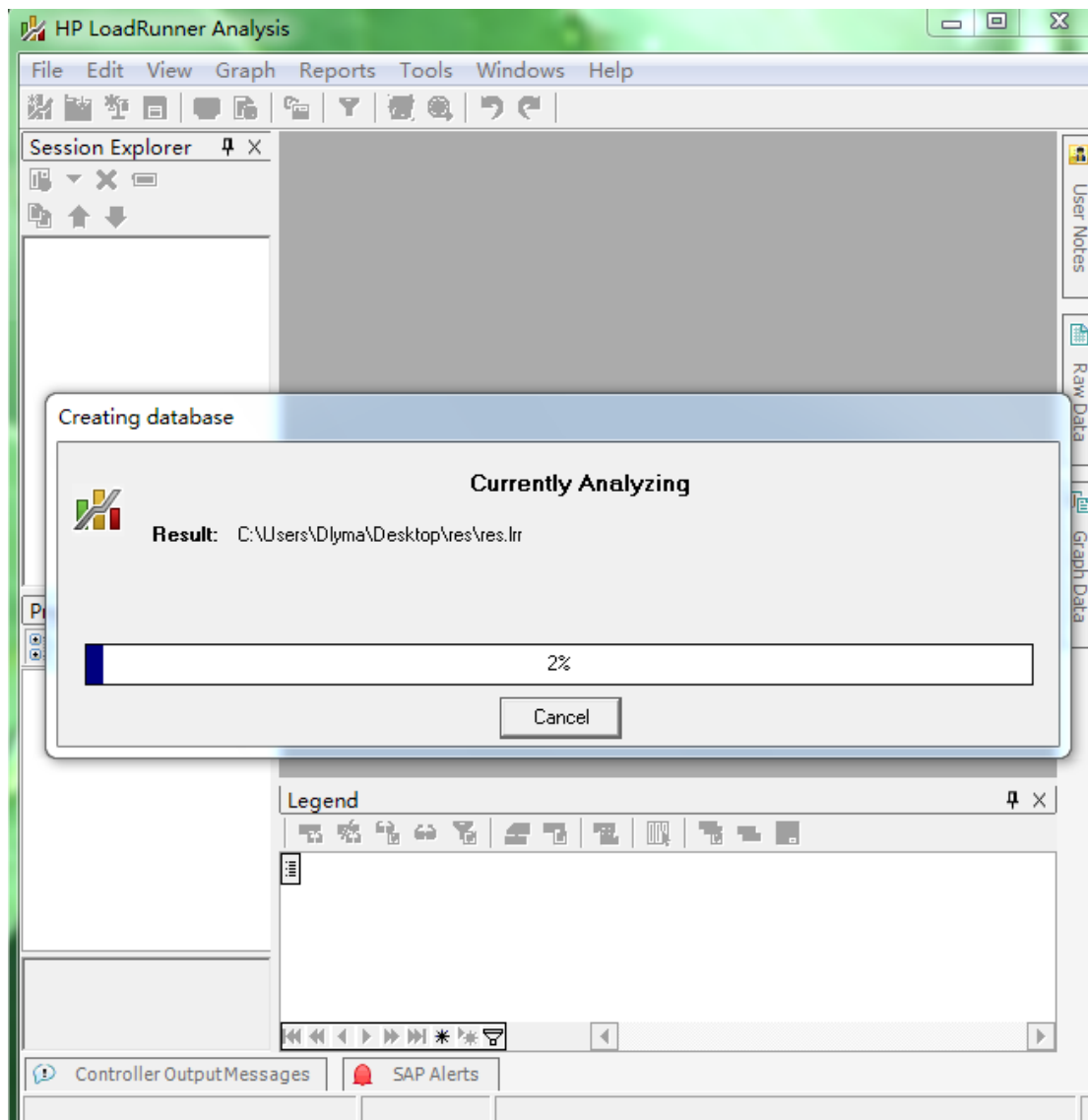
2) 创建脚本：

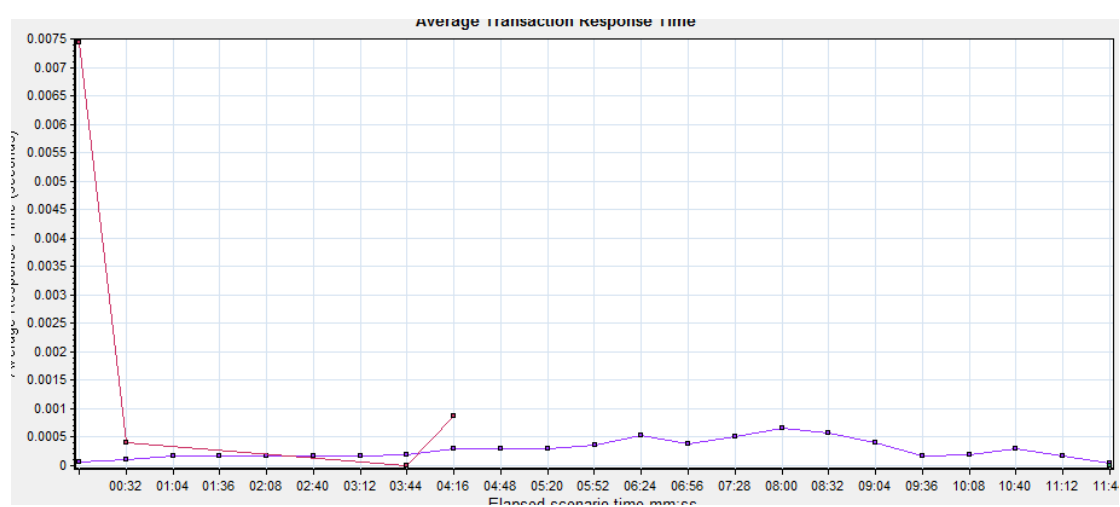
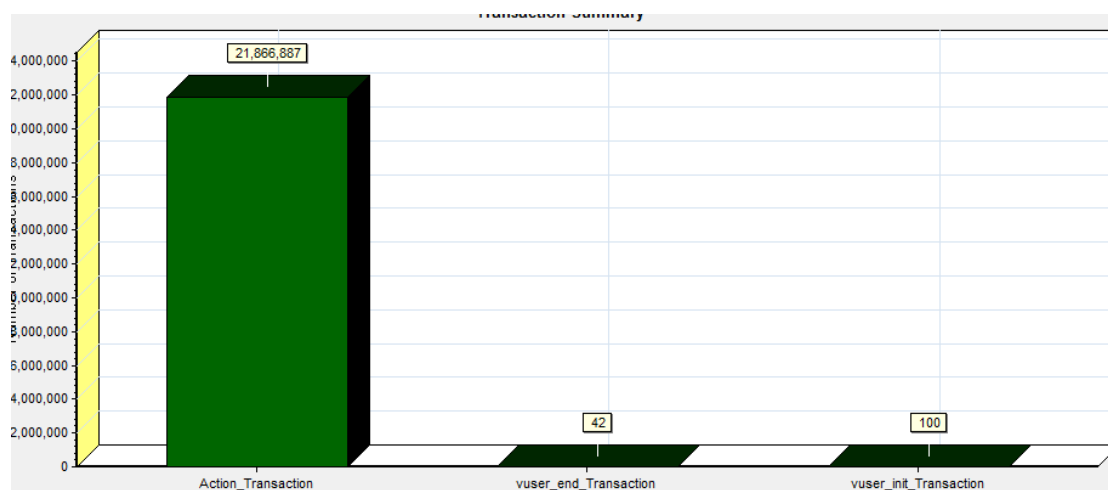


3) 加载压力测试:



4) 结果报告:





6 接口测试

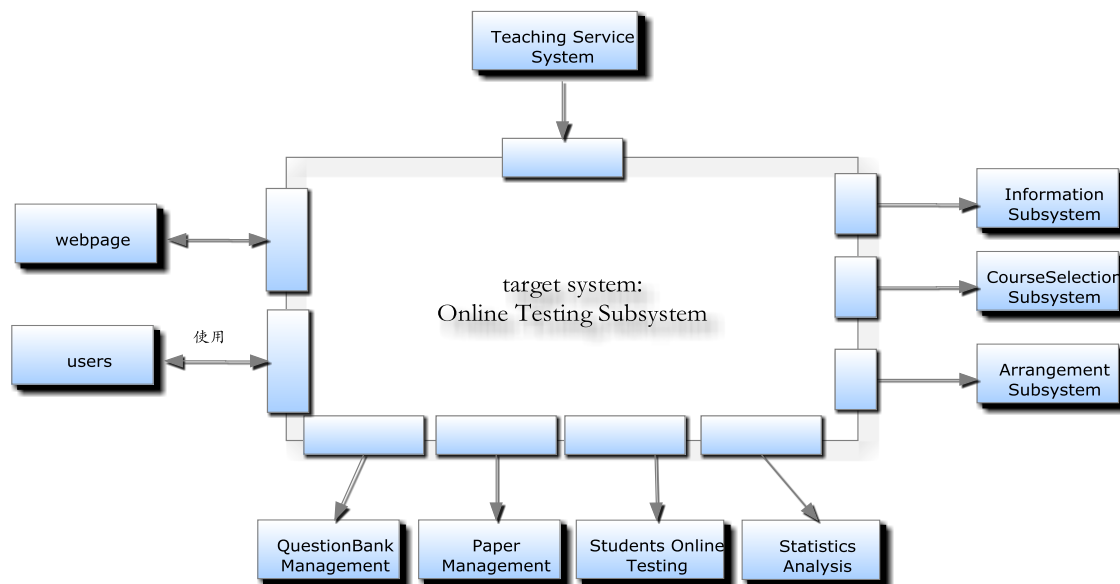


Figure 3 ACD

从上图可见，本系统需要用到信息管理子系统、排课子系统和选课子系统的接口来获取用户权限、教师任课情况和学生选课情况。

从这三个子系统中获取信息的操作主要封装在 `AccountControl` 类来进行，该信息的获取是在用户登录后进入我们的子系统时获取。

本系统将调用这三个子系统提供的接口进行获取信息。这部分可以一起测试。

6.1 信息管理子系统

提供已登录用户的身份及权限。这信息可以由登录我们的子系统后显示的界面来判断：

教师登录：显示教师该学期所任课程列表；

学生登录：显示学生该学期所上课程列表；

管理员/系统管理员：显示所有教师及其任课列表。

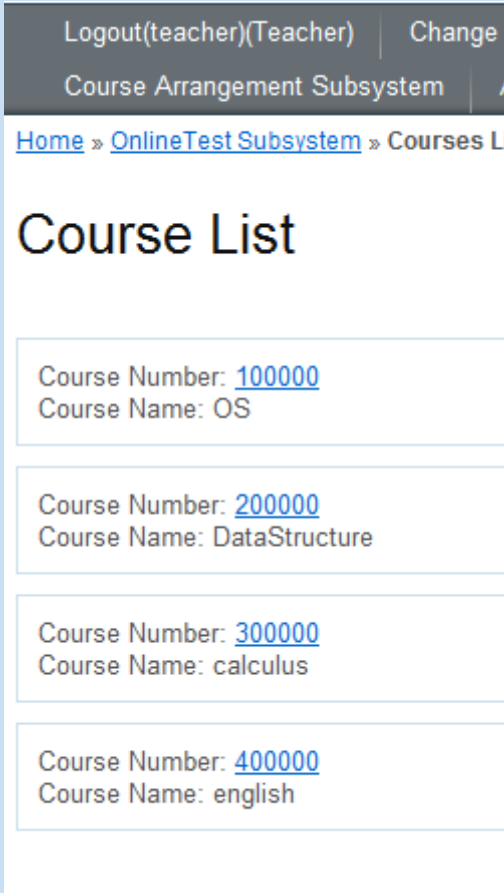
6.2 排课子系统

提供课堂及其任课教师的对应，以及课程上课时间、教室的信息。

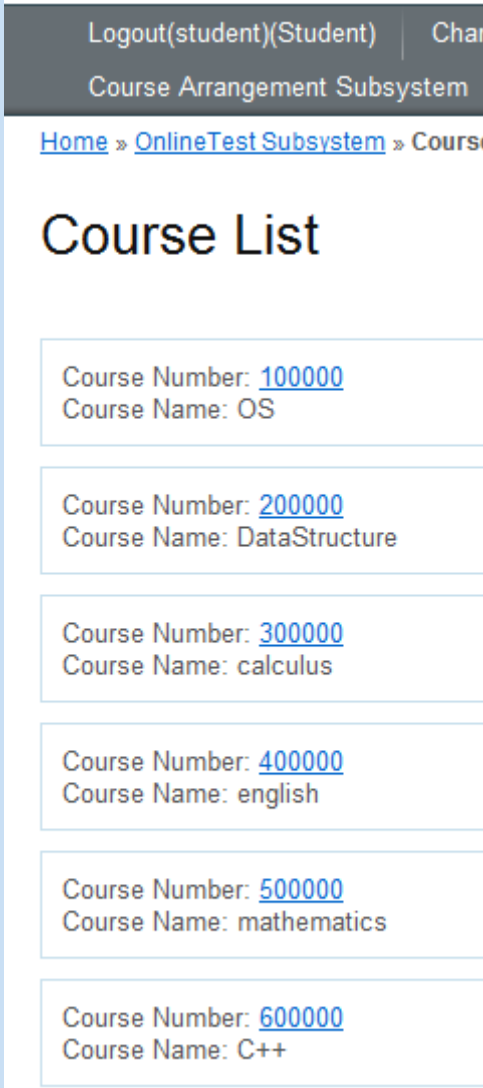
6.3 选课子系统

提供学生和课堂的对应关系。

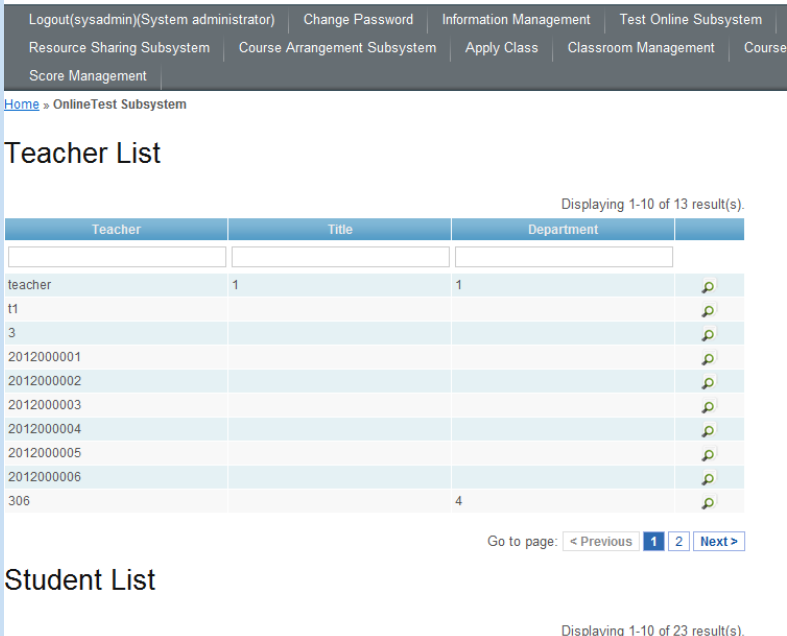
6.4 测试用例

No.	30
测试功能	教师登录
操作步骤	1) 用教师的账号登录 2) 点击导航栏进入在线测试子系统
操作数据	用户 ID: teacher 密码: teacher
预期结果	显示该教师本学期所任课程
实际结果	

No.	31
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测试功能	学生登录														
操作步骤	1) 用学生的账号登录 2) 点击导航栏进入在线测试子系统														
操作数据	用户 ID: student 密码: student														
预期结果	显示该学生本学期课表, 以及其上课时间和地点														
实际结果	 <p>The screenshot displays the 'Course List' page of the 'OnlineTest Subsystem'. At the top, there is a navigation bar with 'Logout(student)(Student)' and 'Char'. Below the navigation bar, the page title 'Course List' is prominently displayed. The main content area lists six courses, each with a 'Course Number' and a 'Course Name'. The course numbers are hyperlinks: 100000, 200000, 300000, 400000, 500000, and 600000. The course names are OS, DataStructure, calculus, english, mathematics, and C++.</p> <table border="1"><thead><tr><th>Course Number</th><th>Course Name</th></tr></thead><tbody><tr><td>100000</td><td>OS</td></tr><tr><td>200000</td><td>DataStructure</td></tr><tr><td>300000</td><td>calculus</td></tr><tr><td>400000</td><td>english</td></tr><tr><td>500000</td><td>mathematics</td></tr><tr><td>600000</td><td>C++</td></tr></tbody></table>	Course Number	Course Name	100000	OS	200000	DataStructure	300000	calculus	400000	english	500000	mathematics	600000	C++
Course Number	Course Name														
100000	OS														
200000	DataStructure														
300000	calculus														
400000	english														
500000	mathematics														
600000	C++														

No.	32
测试功能	管理员登录
操作步骤	1) 用管理员的账号登录

	2) 点击导航栏进入在线测试子系统
操作数据	用户 ID: admin 密码: admin
预期结果	显示所有教师/学生信息
实际结果	 <p>The screenshot displays the 'OnlineTest Subsystem' interface. At the top, there is a navigation bar with links: Logout(sysadmin)(System administrator), Change Password, Information Management, Test Online Subsystem, Resource Sharing Subsystem, Course Arrangement Subsystem, Apply Class, Classroom Management, and Course Score Management. Below the navigation bar, the breadcrumb 'Home > OnlineTest Subsystem' is visible. The main content area is titled 'Teacher List' and shows a table with columns: Teacher, Title, and Department. The table displays 10 results, with the first row showing 'teacher', '1', and '1'. Below the table, there is a 'Go to page:' section with links for '< Previous', '1', '2', and 'Next >'. The 'Student List' section is partially visible at the bottom of the screenshot.</p>

No.	33
测试功能	系统管理员登录
操作步骤	1) 用系统管理员的账号登录 2) 点击导航栏进入在线测试子系统
操作数据	用户 ID: sysadmin 密码: sysadmin
预期结果	显示本学期所有课堂信息











实际结果

[Logout\(sysadmin\)\(System administrator\)](#) | [Change Password](#) | [Information Management](#) | [Test Online Subsystem](#) | [Resource Sharing Subsystem](#) | [Course Arrangement Subsystem](#) | [Apply Class](#) | [Classroom Management](#) | [Course Score Management](#)

[Home](#) » [OnlineTest Subsystem](#)

Teacher List

Displaying 1-10 of 13 result(s).

Teacher	Title	Department	
teacher	1	1	
t1			
3			
2012000001			
2012000002			
2012000003			
2012000004			
2012000005			
2012000006			
306		4	

Go to page: [< Previous](#) [1](#) [2](#) [Next >](#)

Student List

Displaying 1-10 of 23 result(s).

7 测试环境配置要求

7.1 硬件配置

1. 服务端：

最低配置：Intel 奔 4 处理器，1G 内存， 10M 网卡， 10M 带宽

推荐配置：Intel 双核处理器，2G 内存， 10M 网卡， 10M 带宽

2. 客户端：

最低配置：Intel 奔 4 处理器， 512M 内存， 10M 网卡， 1M 带宽

推荐配置：Intel 双核处理器，2G 内存， 10M 网卡， 2M 带宽以上

7.2 软件配置

1. 服务端：

操作系统：Win7

服务器：Apache

数据库： MySQL

2. 客户端：

操作系统：Win7

浏览器：IE 8.0 及以上、Chrome、Firefox