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Research and Development of C Language Programming Experiment Assistant Management Platform Based on Hybrid Architecture

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Abstract

C language experiment management and the control model based on hybrid architecture of C/S and B/S are presented by studying C language programming experiment assistant platform, and apply these results to control and manage experimental process and teaching effects, and realize paperless mode of C language programming teaching and experiment process, at the same time, in a certain extent, to improve experiment teaching quality and teaching effect.

1. INTRODUCTION

C language programming is an important foundation course of computer teaching, and experiment teaching is a key step of learning in science and engineering Colleges[1], as a course that interrelated with computer, at present, by investigation, most colleges adopt experiment teaching mode is: teachers arrange experiment content in advance, and explain experiment key points in experiment teaching class, students do experiment operation freely according to arrangements of teachers, and teachers site guidance, at the same time, experiment reports as students experimental results still rest on foundation of paper ,because requirements writing content is more, experiment reports are often added to complete after school, so it is difficult to do site submitted, such mode should waste many manpowers, financial and material resources, and also exist many problems in writing and review, management is not convenient, experiment reports

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also easy are lost[2]. In the information age of today, this traditional mode will be replaced by information management based on computer. In order to enable experiment teaching, reflect the characteristics of information, make its more standardized and more scientific, so designed and developed a set of C language assistant platform, it's very good to a certain extent solved the above problems, the platform is simple and practical, is good tool for teachers teaching and experiment management and student experiment of network course learning under the network environment.

2. C LANGUAGE PROGRAMMING EXPERIMENT ASSISTANT MANAGEMENT MODEL BASED ON HYBIRD ARCHITECTURE

In order to being favor of experiment teaching management and process control, design of experiment assistant platform use a hybrid architecture control model, the specific model is expressed as H, the model H includes two levels ,first-level C is C/S framework, second level B is B/S framework.

$$H=C+B \qquad (1)$$

Where C/S framework achieve control of experiment process, such as student attendance statistics, student experiment status control and track locking control function to users. B/S framework can realize process control of C language experiment teaching, include assess module of experiment preview and module of releasing experiment content and module of experiment content management, module of experiment reports management and online review module of experiment reports and statistics and summary module of experiment reports scores etc.

2.1. Design of C/S framework

Here, Programs transmission protocol on the sockets interface of Windows to realize listening and connection between the server and clients. The server would collect IP address of the client computer automatically, after starting the client computer, the user would enter login page of experiment assistant platform, students can login this system after input some related information, then these students login information have been send to the server. The experiment control model of C/S framework shows as figure1.
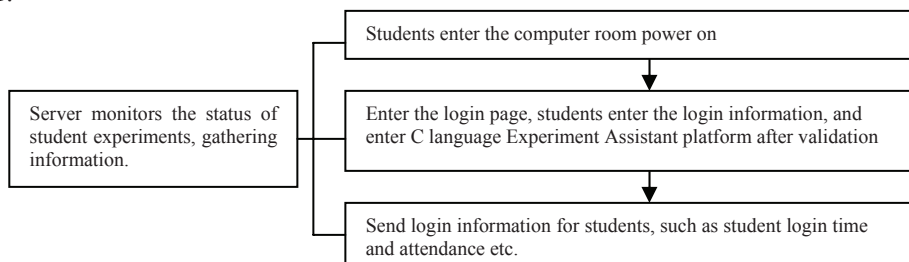

Figure 1.   Control model of experiment

2.2. Experiment application process based on B/S framework

C language experiment teaching process control and management use B/S framework based on WEB, students can access all function module of the system according to experiment process arrangements by using browser after enter this system. Firstly enter examination module of experiment preview situation, then investigate students preview situation and to give examination scores, and these can provide basis for targeted counseling of teachers, at the same time, supervise and urge student doing good preview works before class, and then enter download module of experiment content, so students can read experiment instruction, download experiment requires and contents, and student can operate experiment over teacher

unification instruction. In this process, students can begin experiment operating freely according to teachers provide experiment requires by experiment content management module, and write experiment reports in term of fixed experiment report pattern, and send these reports to the server, and also can download those uploaded report to do modification operation. The management module of experiment content shows as figure 2.

Figure 2.   Modules for experiment content management interface
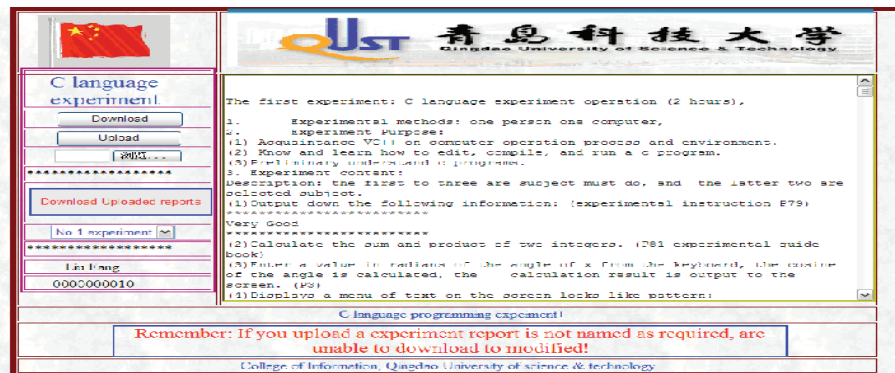
In order to making experiment reports can be managed and reviewed expediently, the system design especially automatic filtering function to experiment reports, experiment reports that do not conform to naming regular would give error warning, these can make uploaded experiment reports more according with criterion, and management of experiment reports also more ordered. The naming rule of experiment report shows as follows:

Experiment report file name=Student ID+Name+Experiment report+Experiment serial number （2）

Where student ID select latter ten number of student in the school's roll number, the name is student name, and experiment serial number, according to experiment schedule arrangement, default is from one to ten. The reference format of experiment report is : *09001001023-Wang haihong-experiment report one.doc* . Experiment report naming detection in addition to testing the file name, and file extension name can also be detected, so as to avoid occurring of naming double extension, such as **.doc.doc*, experiment reports standardized naming would benefit of automatic classification management of experiment report.

C language programming experiment assistant management platform can assess experiment report by using fuzzy control model, and assess key points use mode of classified management and random display, can make assess results are more objective and fair. Specific algorithm realization are that each experiment set 30 small questions, and serial number from 1 to 30,   when experiment began, each student use student ID to login assistant system, as student ID is 0818050123, last two bits of student ID is serial number of student, range is for 01~30, where student ID express as "Sid", actual of questions ID express as *"A"*, questions ID of logic display express to *"L"*, *L* express as following:

$$L=(A*Sid)\%31 \tag{3}$$

Where % express modulo operation. 31 is the smallest prime number of close to 30, so preview questions of each adjacent t student have different display order, at some extent can prevent students cheat each other. When students have completed experiment preview, must to submit preview results to the server, then students can operate next experiment contents. This system can do scoring for students submitted experiment preview answers automatically, and sum to save to the server for teacher providing basis to grading on the experiment.

2.3. Design of experiment control and management

Control and management of the experiment process embody in an experiment management subsystem in B/S mode, main functions include: ① the basic maintenance of the system; ② experiment content releasing; ③ experimental report callback; ④ review of experiment report; ⑤ sum of experiment scores.

The basic maintenance of the system are completed by system administrator, it is responsible for the setting of the system, database management, addition and remove of users etc. This system can realize automatic collection and classification function of experiment reports according to course and class , the collection path of experiment report is designed as follows figure 3.
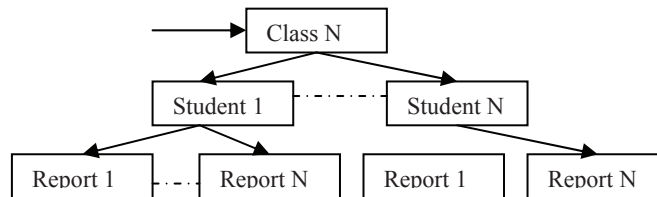

Figure 3.   Save path of experiment report

Teachers use their own ID to login experiment management subsystem, then release experiment content and requirements, update experiment content, online and interact with students, review experiment report of courses, output sum of experiment scores and experiment results etc. Students registration form record student attendance of the experiment, scores of experiment preview and review scores of experiment report, as well as the final scores of the experiment, the evaluation model is set to C:.

$$C = \frac{K1}{N} * 20 + \sum_{N}^{i} (s_i / M) * \frac{20}{100} + \sum_{N}^{i} (b_i w_i / M) * \frac{60}{100} \tag{4}$$

Where *C* is last experiment scores, *K1* is experimental attendance number, *N* is the total number of attend experiment, S_i is preview scores of each experiment, W_i is the weight of the experiment, B_i is review scores of each experiment report. This system can realize rationalization and effectiveness of experiment scores evaluation over performance evaluation model, and can reflect effect of experiment teaching and true level of student experiment process objectively.

3. APPLICATION AND REALIZING OF THE SYSTEM PLATFORM

Design of the system platform is oriented to experiment teaching of C language programming in our school, Visual Studio 2005 development platform is used, and database structure and function are design by Microsoft SQL2000/2005 database system in the system[3,4,,5,6], program codes is generated after in-depth of system feasibility research and project developed, and the system functions are achieved after tested repeatedly and make out network performance, then this system have be applied in 2010-2011 second semester of school year. In applying process of C language programming experiment assistant platform, in order to grasping situation of students application accurately, and knowing actual opinions of students to this system, so as to improve and perfect this system, where questionnaire survey are provided in three class student of pharmaceutical profession, and provide ninety one questionnaires, and take back ninety one questionnaires. The statistical results of selected issues in statistic questionnaire shows as table 3.1.

Table 3.1 Student questionnaires of C language programming experiment assistant platform

Survey content	Option A Check rate（%）	Option B Check rate（%）	Option C Check rate（%）
1、Do you think the application of the system for the C language to improve the quality of experiment teaching ?	Necessary, 100	General , 0	The effect is not significant 0
2、Do you think using experiment teaching system of this form	Relatively new , 71.4	General , 26.4	Need for further innovation 2.2
3、Do you think this way of teaching for the situation of knowledge	Some help , 86.8	General , 9.9	Still not a perfect 3.3
4、Do you think this way for experiment teaching	Useful supplement 93.2	Have some effect 4.4	The effect is not significant 2.4
5、System application for the effect of experimental teaching	Some help, 92.3	General,,,5.5	The effect is not significant 2.2
6、System application for experiment teaching content	Some complementary role , 94.3	General, 3.4	The effect is not significant 2.3

It can see from investigation results: Application of the system improve experiment teaching quality of C language programming, this one point get consistent recognition for investigated students, it reflext reform of C language programming course is successful, although exist some problems in actual application, helpful role is significantly for students learning and teaching of teachers, the system would be amended according to students pertinent advice.

4. Conclusions

Research thought of this system is based on rationalizing experiment teaching process and standardizing experiment teaching mode for starting point, experiment process are standardized by using Man-computer dialogue, this can simplify tasks of teachers in experimental teaching, highlight guidance role of teachers, makes teachers can real-time understand students experimental status, instruct student effectively in time.This system can create experiment report model automatically, and teachers can also read and review students experiment reports by this system, experiment report scores can reflect real student situation justly and accurately, so make teachers hold first-hand information of students experimental process truly, at the same time ,the system can analyze and statistics experimental report, these can provide teachers strong support of experiment sum and follow-up experiment guidance after class, to some extent standardize experiment steps, enhance experiment effect and efficiency, these provide teacher and students creating experimental environment of more science standardization.

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