Ceiba: Tools for Asynchronous Learning on the Web

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Abstract

Ceiba is a set of tools which helps teachers to build their own course-related home pages. On these home pages, both passive and active elements reside. The passive elements refer to those traditional web publications, such as course outlines and introductions, which deliver information only in one direction, and thus, are passive from the students' point of view. In contrast, the active elements consist of student feedback and interactions, such as homework, questions, discussions, and comments. Ceiba has been tested and seems to successfully achieve our three design goals: to provide a more comprehensive way of knowledge acquisition, to provide an efficient means of interactions and feedback outside the classrooms, and to provide a convenient and user-friendly interface to both teachers and students without special computer backgrounds such as CGI programming. In the future we are going to continue the development of Ceiba, expanding its application into many other fields, such as literature, engineering, medical, and scientific courses, while keeping on enhancing its user interface so that teachers and students can feel more comfortable using Ceiba.

I. Introduction

The progress of communication technologies and the increasing popularity and usage of personal computers have connected more and more people in a cost-effective way, resulting in the explosive growth of the size of the Internet community, especially that of the World Wide Web. In the education system, using networked multimedia-support personal computers brings not only the change of forms in the process of knowledge acquisition, but also the possibility that learning can take place asynchronously among physically dispersed participants by simply connecting them to the Internet. With the help of proper tools, students can have a more efficient and convenient way than ever to inherit the invaluable common property of human beings.

Ceiba is an integrated set of tools developed by the *HPC LAB, NTUEE,* which helps teachers and students to improve the quality of learning on the web. Ceiba helps teachers prepare their teaching material and build course-related home pages, through which asynchronism of learning can take place. Students can interact with other students and browse around to meet their individual needs. More specifically, Ceiba helps teachers to

prepare their homework and build the corresponding home pages so that the students can do and hand in their homework simply using a web browser; it also facilitates teachers, teaching assistants and students to share and exchange their opinions in a more convenient way than in a traditional classroom or email system through the use of the web bulletin board system.

II. Design Goals

Ceiba was designed with three major consideration, or design goals, in mind:

1. To provide a more comprehensive way of knowledge acquisition.

The abilities of modern multimedia-support computers to present in diverse ways have made possible for the teachers to prepare the material to be taught on computers and in a variety of forms, from the simplest hyper text form to 3D video animation/movie with rich sound effects, which helps students to organize, to understand, and to fully comprehend what they ought to know. Through communication network and Internet, students get access to the prepared material. The traditional teaching methods, however, can not entirely be replaced by Ceiba; classroom lectures and more importantly, the interactions between teachers and students are nevertheless invaluable and can not be substituted. In this sense, Ceiba serves as an auxiliary to classroom teaching, providing an alternative and enhancing traditional teaching skills.

2. To provide an efficient means of interactions and feedback outside the classrooms.

Interactions and feedback in class are very important, as mentioned in the previous section, for students to gain better understanding and insights into what they are studying. Besides class hours and outside the classroom, students usually find themselves in need of an efficient way to communicate not only with the teacher or the teaching assistants, but also one another, so they can take advantage of discussing, and sometimes even arguing and disputing, with their classmates. A design goal of Ceiba is to provide such a channel; teachers and students can discuss freely and asynchronously on the web through the use of the web bulletin board system.

3. To provide a convenient and user-friendly interface to teachers and students without special computer backgrounds.

Despite the increasing familiarity to the computer terminology and technologies of the general public, not all of the teachers and students have enough computer-related backgrounds; not every student knows how to send an email, for example. Therefore, designing a convenient, user-friendly and self-explanatory user interface should be a desired feature for those who are not so familiar with computers. Even for an expert, such an interface will in some extent reduce the learning time overhead, letting him/her concentrate on the learning activity.

III. Framework

In Ceiba, besides traditional web publishing techniques such as hypertext and graphic presentation, there are two main tools: students database administration and maintenance tools and web bulletin board system, which work together to help learning.

Students database is a database, which contains not only static information such as his/her name, email address, ⋯, etc., but also dynamic information regarding the course and past record of him/her, e.g., how

he/she did in class, whether he/she has handed in all the previous homework, and how good or how bad he/she did previously.

The web bulletin board system is just like an ordinary bulletin board system(BBS for short), on which people can post articles, discuss asynchronously by replying posts, and "talk" to other people on-line.

We put these two as hyper links in the page in which the goal and the outline of the course are introduced. While browsing, students can simply click the corresponding links or buttons, and they can read what the teacher or other students try to express, or have their opinions typed in to share with others. They can also read the detailed instruction of how to do their homework, as well as do their homework on the web using the very same web browser without any additional knowledge or labor.

IV. Implementation

Students database maintenance tools are implemented using one plain text file as its central database and several accompanying PERL scripts as the access interface. In fact, the database can be implemented with any existing or custom database system, as long as it provides the same interface currently employed by Ceiba to the CGI front-end programs. We didn't use any query language now since Ceiba is only a small system. Fig.1 shows the layered structure of such configuration.

Fig.1

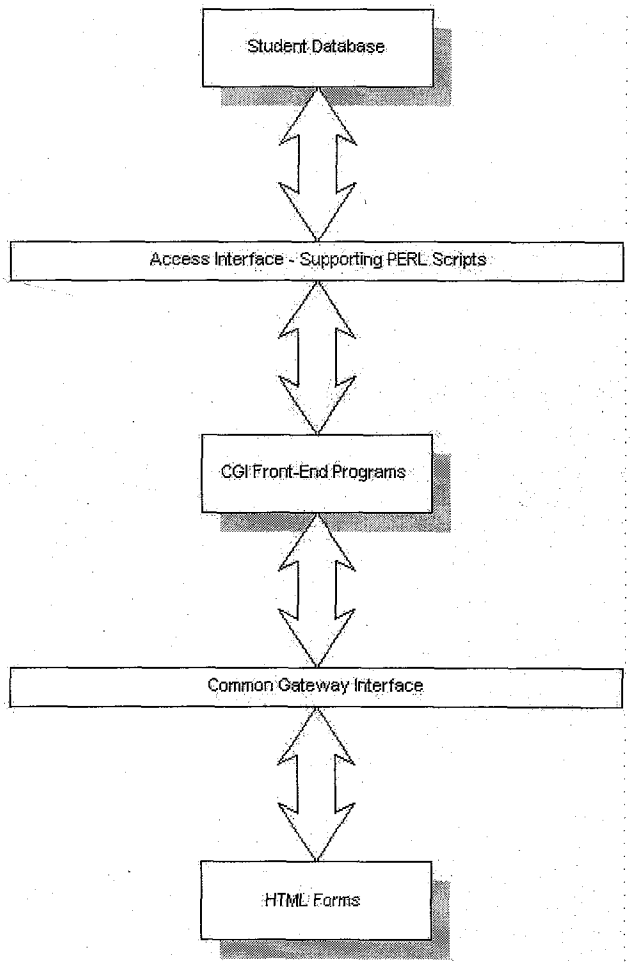
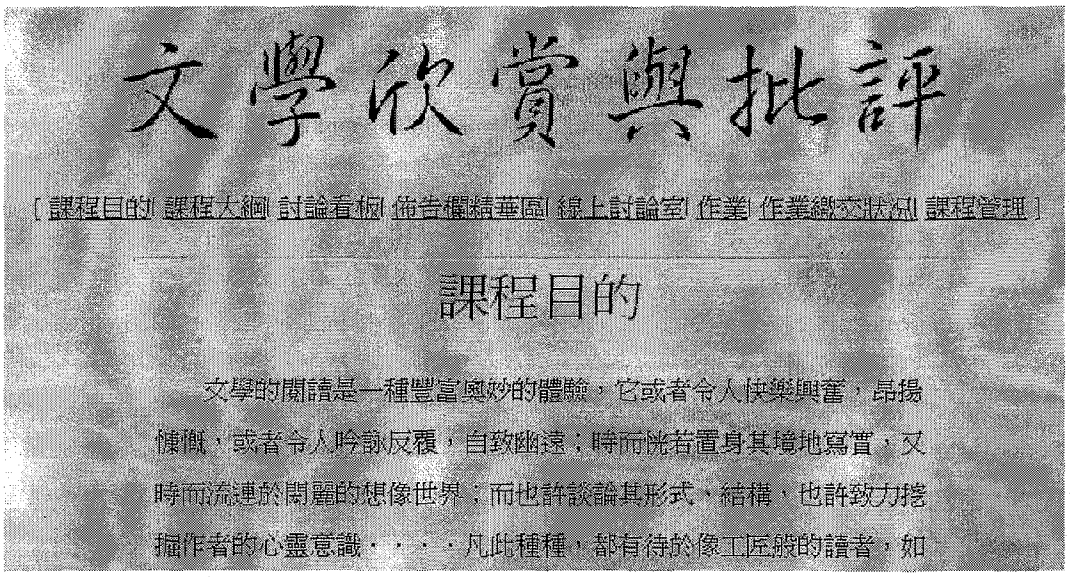


Fig.2



Here are some demostrative figures showing how Ceiba looks and works. Fig.2 shows the main page on which students can study certain important materials their teachers have prepared for them. There are also links for students to study their homework and to discuss with their classmates. In addition, there is a link for an authorized person such as a teacher or his/her teaching assistant to prepare the homework, to score the delivered homework, and to maintain the student database, as shown in fig.3.

Fig.3

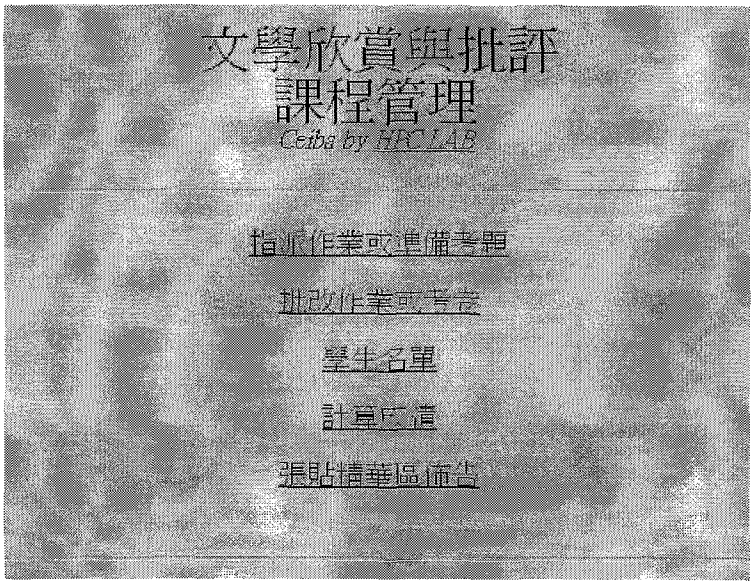


Fig.4

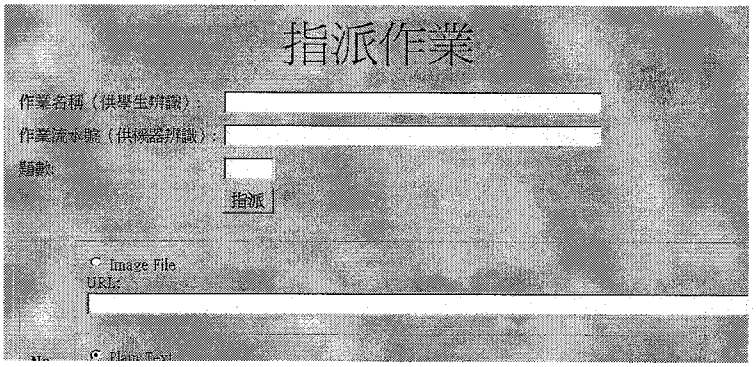
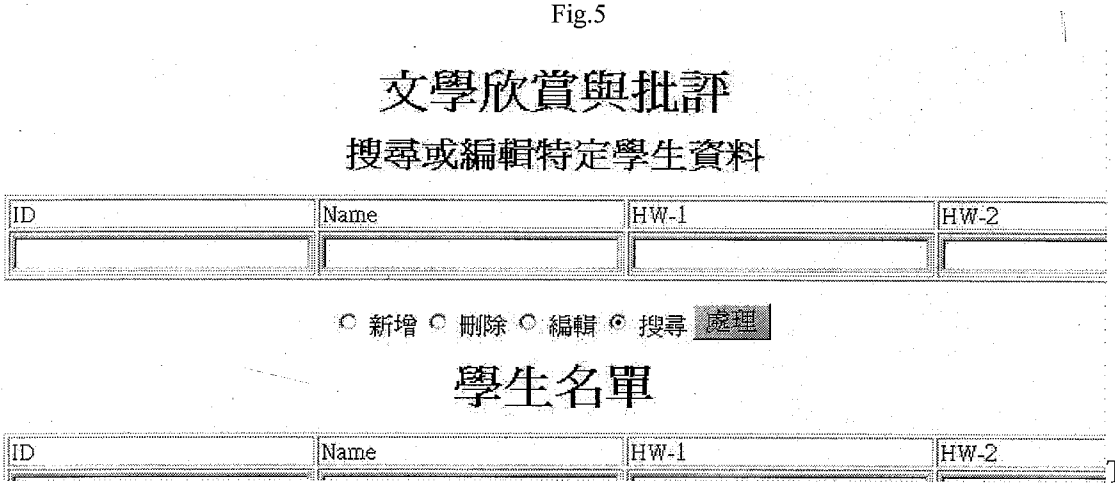


Fig.4 shows our homework builder. Teachers and teaching assisants only have to fill this form to prepare their homework. They can have their plain-text problems typed in, or give the URL of a graph to prepare a problem with a depictive figure.

Fig.5 shows where the authorized persons can maintain the student database. They can have the entire list typed in and paste it in another page, or they can edit and correct each field individually.

Fig.5



The web bulletin board system is implemented using two PERL programs written by Matthew M. Wright[1] and by Yu-Cheng Hsieh[2] , respectively.

Ceiba has been initiated and tested on the course: "The Appreciation and Criticism of Chinese Literature," taught by Professor Y. Y. Cheng[3], Department of Chinese Literature, National Taiwan University.

Any questions or comments concerning technical issues please send to Chen-Mou Cheng[4], Department of Electrical Engineering, National Taiwan University.

V. Conclusion

Ceiba has been set up and running for a period of time. It is proved that this small system works robustly and strongly meets our design goals. We are trying to extend the use of Ceiba to a broader variety of fields including several courses of literature, engineering, and science. In the future, the ability to handle scientific expressions and figures will be an important issue, while a more user-friendly, easy-to-use interface is under construction and experimentation.

These decades saw the emergence and the advance of computer science and communication technologies. Now it is time to bring these advances into different aspects of our lives; education system is no doubt among the most important aspects of life. How we can take advantage of such technology break-through rather than leave it intact in the laboratory might be one of the most important issues for the following few decades.

Reference

1. **WWWBoard**, Version 2.0 ALPHA 2; Matthew M. Wright, email: mattw@worldwidemart.com

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