



Design of Online Training System for Innovative and Entrepreneurial Talents Based on Interdisciplinary Integration

Yu-feng Men^{1(✉)} and Hong Cai²

¹ Dalian University of Science and Technology, Dalian 116052, China

² Weifang Engineering Vocational College, Weifang 262500, China

Abstract. Since the current online talent training system only focuses on talent training resources in a certain discipline, the number and types of resources shared within the system are relatively small, so it is necessary to design a multi-disciplinary cross-integrated innovative and entrepreneurial talent online training system to expand the amount of data resource sharing. The system is designed from both hardware and software aspects. In the hardware design, related parameters such as servers and storage devices are designed, and the overall system architecture is designed; in the software design, the resource information processing in the system is first completed, and the system resources The video is encoded and decoded, and the server and client are separately maintained through Socket to realize the accurate identification and communication of resource information; then the system database ER diagram and database table are designed. In the performance simulation test of the system, the experimental results show that the maximum number of shared resources of the designed system is 1 million, which is a significant increase in the number of shared resources of the original system, which verifies the effectiveness of the designed system.

Keywords: Interdisciplinary integration · Innovative and entrepreneurial talents · Online training · System design

1 Introduction

In the era of knowledge economy, innovation and entrepreneurship has become an important theme of world economic development. Countries all over the world attach great importance to the important role of innovation in promoting social progress and economic development, and have issued various policies to promote and promote innovation and entrepreneurship. With China's sustained and rapid economic growth, the rapid development of industry, agriculture and service industry has given birth to a large number of talent demand. In 2001, China joined the WTO, the domestic competition became international, and the competition for innovative talents became increasingly fierce [1, 2]. At present, the main contradiction between supply and demand of talents in China is the contradiction between the growing demand for innovative talents and the traditional

mode of talent training. This leads to a significant dissimultaneous interpreting between talent training and talent demand in the universities. On the one hand, the demand for high-quality innovative talents is far from being met, and on the other hand, a large number of graduates are hard to obtain employment. This contradiction seriously restricts the healthy and sustainable development of China's economy and higher education. Therefore, to adapt to the needs of the development of the times and industry, to reform the talent training mode in Colleges and universities and to improve the training level of application-oriented innovative talents is an important issue to be solved in China's higher education.

The traditional talent training system has been unable to meet the higher needs of society, so the talent training mode of interdisciplinary integration arises at the historic moment. Interdisciplinary is to integrate two or more disciplines, master more than two disciplines knowledge, have more than two disciplines skills, and learn to integrate knowledge and skills. The cultivation of innovative and entrepreneurial talents by interdisciplinary integration is to integrate two or more disciplines in the process of talent cultivation, so as to cultivate college students' innovative and entrepreneurial ability and improve their comprehensive quality. To this end, this article proposes a multi-disciplinary cross-integration of innovative and entrepreneurial talent online training system design. Servers and storage devices constitute the hardware part of the system. Use video encoding and decoding and frame rate calculation to improve video fluency. Paradigm theory is used in database design. This completes the software design part of the system.

2 Multi-disciplinary Cross-Integration of Innovative and Entrepreneurial Talent Online Training System Design

2.1 Hardware Design

The users of this system are divided into teachers, students and administrators. Each type of user has its own corresponding authority and corresponding functions. Generally speaking, it is composed of home page, daily summary, weekly report, project information, personal files and resource sharing modules, covering all aspects of online communication between students and teachers during school. Development tools are an important means to build a hybrid architecture of resource sharing system. Development tools mainly include servers, storage devices, operating systems and functional software. As the operation core of the whole system, the server selects the Dell (TM) upgraded PowerEdge r740 dedicated server, built-in Xeon SP scalable series processor, equipped with inter c621 series chipset, supports DDR4 2666 (24 slots), with 8 3.5-disk hard disk facilities, em 64t, 800 MHz front-end bus, with up to 8 pcie3.0 slots, h330, h730 and h740 array cards, Broadcom gigabit network card (four ports) is provided, which can play the role of central node of hybrid architecture, provide large capacity data interaction for the whole system, and expand the number of data sharing of the system; the storage device adopts the way of connecting disk array and database server. It can save the historical data and forecast data of database system and application system, which is convenient to call and share [3, 4]. As a resource sharing system, business data

will grow greatly over time, and data records will become increasingly large, so there is a higher requirement for the scalability of database driver interface. Operating system is the basis of system operation. For small and medium-sized enterprises, the operating system of enterprise network generally adopts Linux, which has low requirements for server hardware, and can meet the server configuration of PC server of small and medium-sized enterprises to the greatest extent, and has good stability in daily operation. It integrates windows pages, which is easy to operate, powerful and widely used for users. Under this design concept, the system design architecture is as follows (Fig. 1):

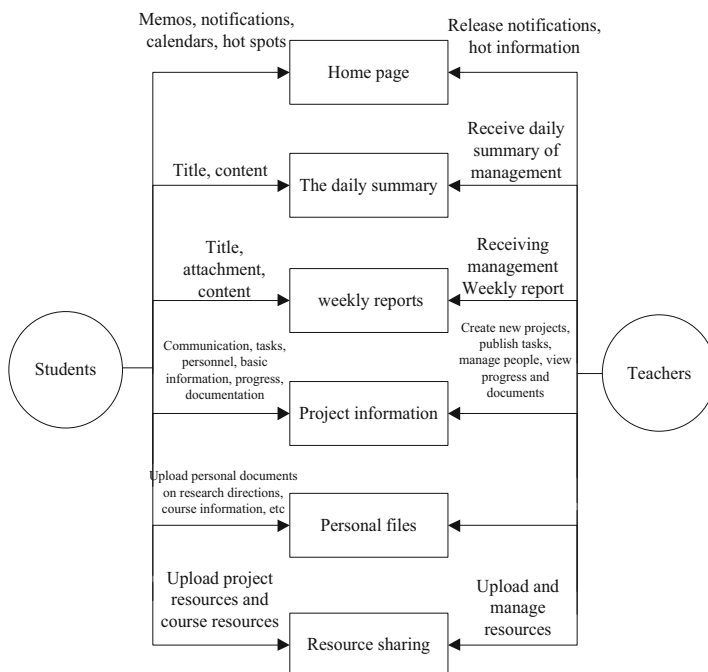


Fig. 1. System design architecture

For the successful construction and continuous application of the system, the development process needs to follow the unified design principles of the system. When designing the system, System structure should be comprehensively planned, especially the system construction structure and database structure. The overall situation needs to be considered. Seeing the problem requires the principle of advanced nature. In system construction, the trend of maturity, advancement and internationalization should be adopted. In the process of construction, The relevant standards should be fully followed. Mature and stable mainstream website architecture should be used for reference. and ensure the scalability and sustainable use ability of the system; in the principle of scalability, the construction of information system must take into account the changing development needs, and in the design, The relationship between modules should be fully considered, so as to reduce the cost Block coupling.

2.2 Resource Information Processing in the System

In the online training system of innovative and entrepreneurial talents designed in this paper, the most important teaching resource information is video resources. In fact, video playback is to quickly switch multiple images with subtle differences in the same position. For human vision, it is like the image in “motion”. This sense of image motion gives people the experience of video. When playing the video, when the frame rate reaches 16–24 fps, for the naked eye, what you see is smooth video [5, 6]. In general, the video files used in the online training system are avi, MKV and other formats, which are the packaging format of the original video after the algorithm compression. The capacity calculation formula of the original video can be expressed as follows:

$$F_C = F_W \times F_H \times \frac{F_{bit}}{F_B} \times FPS \times \frac{60}{F_{MB}} \tag{1}$$

In the above formula, F_C represents the capacity required for playback of the original video, F_W and F_H represent the width and height of the video respectively, and the units are calculated in pixels. $\frac{F_{bit}}{F_B}$ represents the conversion between the number of bits and bytes of the video color, and FPS Represents the number of frames, and $\frac{60}{F_{MB}}$ represents the conversion between bytes and megabytes. If calculated according to the above formula, a 45-min MOOC requires more than 375G of capacity. In actual use, the transmission speed and playback quality of the video cannot be guaranteed, especially the network video. Therefore, it is necessary to compress the original teaching multiple information, and the process is shown in the following Fig. 2:

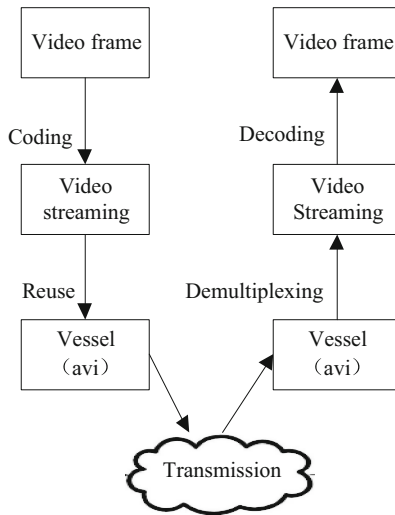


Fig. 2. Schematic diagram of video encoding and decoding

As shown in the figure above, the container refers to the format of the video itself, such as MP4 and other audio and video tracks that have different characteristics, and

the audio and video streams are stored on the track. The stream is generated when the video is encoded by the encoder, so during the playback process, different tracks will be played back synchronously. Therefore, different compression algorithms determine the format of video encoding. This article chooses AAC advanced audio coding. This coding method has more sampling rate and bit rate support, and is more efficient in the decoding process. It can effectively compress audio and video. The difference between lossless compression and lossless compression at a bit rate of 448kbps is very small. It is the best lossy compression format currently in use. In the system designed in this paper, the transport layer is an important layer of interactive communication in the entire system. In the general interactive communication layer, there are generally two important underlying protocols, namely TCP and UDP protocols [7, 8]. This article adopts the Socket API based on C language, this abstraction layer can facilitate users to directly use TCP and UDP protocols. Socket can realize the mode that the server and the client maintain separately, and establish a link to complete the opening, reading and writing, and closing of the file. The process is as follows (Fig. 3):

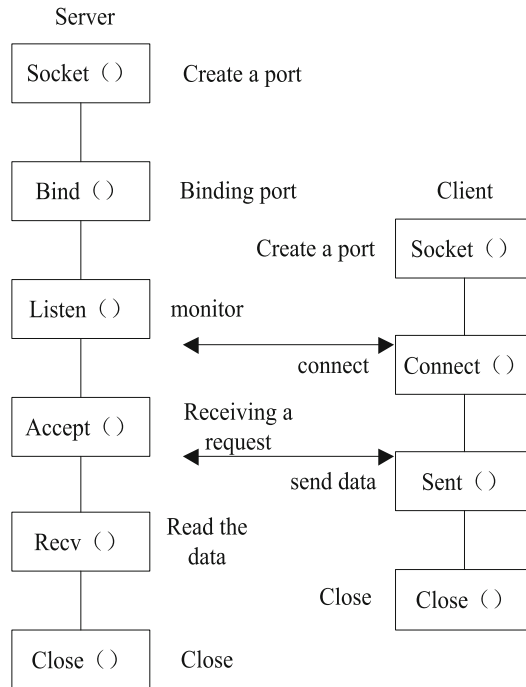


Fig. 3. Socket connection interaction process

In the process of communication, the connection is established and opened, you can write certain content to your own file and save it for the other party to read or read the content of the other party. After the communication ends, the file can be closed.

In the actual interaction process of the system, due to problems such as light in the classroom, it is difficult to identify and communicate during the interaction. Therefore,

it is necessary to improve the system’s tracking and identification algorithm. Make the difference between the pixel value of the pixel point corresponding to the current frame image and the previous frame image, and determine the magnitude of the difference and the threshold:

$$d = |I_L(x, y, i) - I_L(x, y, i - 1)|$$

$$ID_L(x, y, i) = \begin{cases} 1, & d \geq T \\ 0, & d < T \end{cases} \tag{2}$$

In the above formula, $ID_L(x, y, i)$ represents the detection result of the corresponding pixel in the image of two adjacent frames, 1 represents the pixel of the moving target, 0 represents the background pixel, which is the threshold. The threshold setting will be based on the actual situation of the system and the past Operating experience, this article is set to 50. After the binary image is obtained under the above operation, after denoising, the accurate identification and communication of resource information in the system’s interaction process can be realized.

2.3 Database Design

Database design is a very important step in system development and the starting point of software design. The quality of database design is related to the logic and stability of the system, so in the development of software system, the theory of database paradigm is put on the focus. In order to realize the efficient organization, storage and management of data, database design must follow the necessary principles to reduce redundancy and ensure the integrity and correctness of data. The database is the direct response and data performance of the requirements, so the design must meet the user’s needs, repeatedly corresponding to the relevant data, and timely adjust and modify when there are changes [9, 10]. Conceptual structure design is the process of transforming user requirements into conceptual model. Conceptual structure design can fully display the actual relationship,

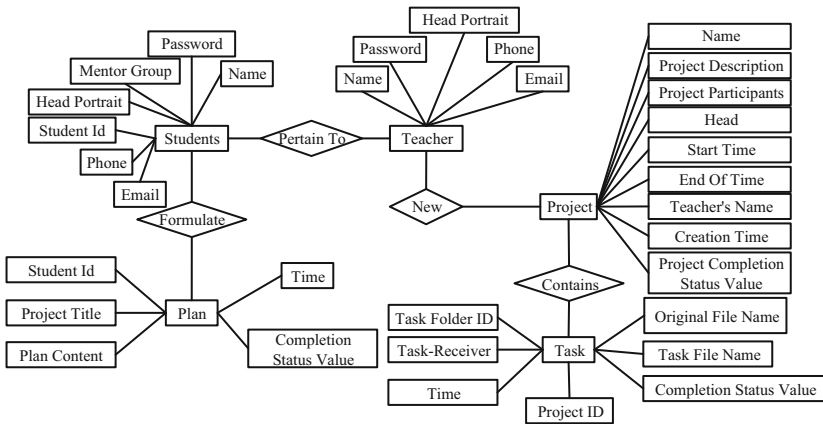


Fig. 4. Entity relationship diagram

easy to understand, easy to change, easy to transform to the relationship, network, hierarchy and other data models [11, 12]. Conceptual structure design uses entity relationship diagram to describe the relationship between entities. Part of the entity relationship diagram of the process management of innovative and entrepreneurial talents cultivation with interdisciplinary integration is shown in the following Fig. 4:

It is mainly composed of students, tutors, plans, projects, tasks and other entities. This system uses MySQL database to ensure the portability of the code, which is suitable for this system. In the database design, the main task is to complete the design of data table structure. Through the design and implementation, it mainly includes the table structure design of six modules, including user management, memo, daily and weekly reports, project information, personal files and resource sharing [13]. In the database, the database tables need to be divided according to the functional design of the system. The division of these database tables t is usually represented by the function matrix, as shown in the following formula:

$$T = \begin{bmatrix} t_{11} & t_{12} & \cdots & t_{1m} \\ t_{21} & t_{22} & \cdots & t_{2m} \\ \cdots & & & \\ t_{n1} & t_{n2} & \cdots & t_{nm} \end{bmatrix} \quad (3)$$

In the formula, n field descriptions can be combined into set A , and m data table descriptions are recorded as set B . Formula (2) can be obtained:

$$A \cup B = W \quad (4)$$

Where, W is the set of subtables of the database, then the formula for the number of subtables divided by the database w can be obtained:

$$w = \sqrt{1.28mn + 4.32m + 4.46n + 0.36} \quad (5)$$

The sub tables of the database are mainly divided into student management database table, memo database table, daily summary database table, weekly report database table, new project information database table, personal task information database table and course resource information database table. The specific field description is shown in the following Table 1:

According to the analysis of users' requirements in the previous chapter, more specific system requirements are obtained. These requirements are designed into the specific functions of the system, and the overall framework of the system is given. On the basis of clarifying the logic of use, a more reasonable and specific data table is designed, and some data tables are given, such as student table, memo table, daily summary table, weekly report table, project table, task table, course resource table and shared resource table, which lays a solid foundation for the construction of the whole system.

Table 1. Database tables

| Field name | Field type | Length of field | Illustration |
|----------------|------------|-----------------|----------------------|
| Id | Int | 10 | – |
| Name | Varchar | 20 | Name |
| Student Id | Varchar | 20 | Number of students |
| Password | Varchar | 20 | Password |
| Group | Varchar | 50 | Panel |
| Phone | Varchar | 11 | Telephone |
| Email | Varchar | 20 | Mailbox |
| Img | Varchar | 100 | Head |
| Plan | Varchar | 100 | Project title |
| Time | Date | – | Year |
| Hours | Time | – | Hours |
| Status | Int | 11 | State value |
| Plan_ Details | Varchar | 500 | Details of the plan |
| Stu_ Id | Int | 100 | Id of student tables |
| Title | Varchar | 100 | Title |
| Content | Varchar | 250 | Daily Content |
| Weekly_File | Varchar | 100 | Annex Name |
| Weekly_Title | Varchar | 100 | Title |
| Weekly_Content | Varchar | 3000 | Weekly Content |
| Orig-Filename | Varchar | 100 | Original Annex Name |
| Week | Varchar | 30 | Week 1 |
| Tern | Varchar | 30 | First semester |

3 System Test

3.1 Build System Test System

After the completion of the system design, in order to find the defects in the system as soon as possible and ensure the reliability in practical application, The system needs to be tested and the results recorded, design comparative experiments to verify whether the number of data resource sharing has been increased compared with the traditional system. The design of the system server uses the parameter configuration in this paper, carries on the page setting and the student source information import in the system, imports the existing student source information to the university end, the information

format imported is dBASE IV version of DBF file, if the information format is excel or other formats, the file needs to be re exported and converted. After making sure that the web server is set up successfully, you can upload and download the required information. First, deploy the architecture of the experimental cloud environment, as shown in the Fig. 5:

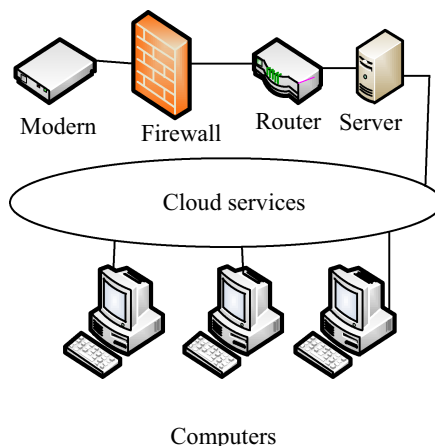


Fig. 5. Cloud environment architecture deployment

The stable operation of the system needs the support of software and hardware environment, and the system is based on J2EE platform. In order to ensure the normal operation of the system, the required software includes JDK compiler, Tomcat server and SQL Server 2005. The server memory needs to be more than 4G, and the hard disk is 512g. Because the system is designed and implemented based on cloud environment, the client needs to install browser. In order to verify that the designed system has a larger number of data resources to share, it is necessary to use KVM converter to control the user hosts in different areas. The KVM converter uses rekason sp1708-b, and its parameters are as follows (Table 2):

Table 2. KVM converter parameters

| Order number | Relevant parameters | Specific indicators |
|--------------|-----------------------------|---------------------------------|
| 1 | Number of hosts connected | 256 |
| 2 | Scan interval | 1–255 s |
| 3 | Input and output interfaces | USB interface conversion module |
| 4 | Power supply voltage | AC 100–240 V, 50–60 Hz, 1 A |

Under the above experimental preparation, the traditional system and the designed system are tested for the number of data resource sharing.

3.2 Experimental Results and Analysis

In the above experimental environment, the KVM converter is used to control different user hosts. After successfully logging into the system, the user hosts are used to count the resource sharing data in the system. The results are as follows (Table 3):

Table 3. Comparison of experimental results

| Number of experiments | Number of resources shared by traditional systems (10,000) | Number of system-sharing resources designed (10,000) | Expected number of shared resources (10,000) |
|-----------------------|--|--|--|
| 1 | 1 | 1 | 1 |
| 2 | 5 | 5 | 5 |
| 3 | 9.7 | 9.86 | 10 |
| 4 | 10 | 49.9 | 50 |
| 5 | 10 | 97.8 | 100 |
| 6 | 10 | 100 | 500 |
| 7 | 10 | 100 | 1000 |

As can be seen from the above table, after the fourth experiment, the number of shared resources of the traditional system reached 100000. In the later experiment, the expected amount was continuously increased, and the number of shared resources of the traditional system did not exceed 100000, indicating that the maximum number of shared resources of the traditional system was 100000. After the sixth experiment, the number of shared resources of the designed system reached 1 million, In the seventh experiment, the expected amount is adjusted to 10 million, and the number of shared resources of the designed system remains at 1 million, which indicates that the maximum number of shared resources of the designed system is 1 million. To sum up, it can be seen that the number of shared resources of the designed system has increased significantly, which verifies the effectiveness of the designed system. This is mainly because the method in this paper uses the paradigm theory to design the database, so the capacity of the database is relatively large. At the same time, the system focuses on the research of multi-disciplinary teaching resources, and the type and number of resources are not restricted by disciplines.

4 Conclusion

The cultivation of innovative and entrepreneurial talents with interdisciplinary integration is a new journey of the reform of talent cultivation mode in Colleges and universities. The establishment of interdisciplinary innovative and entrepreneurial talent training objectives points out the direction of reform for talent training; scientific curriculum system is the main carrier of innovative and entrepreneurial talent training activities, and is

the key step to achieve the goal of talent training; the construction of interdisciplinary innovative and entrepreneurial talent training platform is to find a specific practice path for talent training; the construction of interdisciplinary innovative and entrepreneurial talent training platform is to find a specific practice path for talent training; Teachers are the practitioners of talent training program, and building a reasonable teaching team can provide a strong guarantee for talent training. Only with these basic conditions can the cultivation of innovative and entrepreneurial talents with interdisciplinary integration become a reality, and it is possible to cultivate comprehensive innovative talents from all walks of life for the country. The main contribution of the method in this paper is to expand the number of original system resource sharing and increase the speed of calculation.

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