

The Design and Application of Knowledge Learning System of Criminal Procedure Law Based on NODE.JS

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Abstract: This paper has carried out related research on the development of knowledge learning application system of criminal procedure law. The server side of the system breaks the tradition, chooses Node.js for development, and combines the express framework engine and related components to use JavaScript to realize the functions of file transfer and URL routing of the system. Then the front-end uses HTML5+CSS3+JavaScript language and Bootstrap framework to develop a responsive dynamic page that displays data in the browser. The system developed based on Node.js has the advantages of low R&D cost, easy expansion and high reusability. On the basis of teaching the basic concepts and theories of criminal procedure in the form of video media, the function of the knowledge learning system of criminal procedure law also focuses on the various procedures of criminal procedure. In the form of video cases, the knowledge system of criminal procedure law is displayed intuitively for students, which lays a solid foundation for cultivating high-quality legal professionals.

1 INTRODUCTION

The criminal procedure is one of the key compulsory courses in the law discipline of colleges and universities in China. And colleges and universities are the important positions of law education in our country. The educators of law disciplines should undertake the important mission of promoting the legal system construction in our country. Therefore, we should constantly push forward the process of optimizing and reforming the course of criminal procedure law. However, there are many shortcomings in the current course of criminal procedure law education. First of all, most teachers' teaching is based on unchangeable textbooks, which is easy to be divorced from reality, and case teaching is insufficient. Besides, teachers are the main body in teaching, and students passively accept it, so it is difficult to learn according to students' own situation. The teaching content of criminal procedure is more complicated than other subjects, and it is difficult for a single book teaching to present all the key contents. (Liu, 2022)

According to the above analysis, the author of this paper believes that the teaching form of criminal procedure law should be reformed and optimized digitally with the help of information technology in the current Internet era. So, this paper studies the knowledge learning system of criminal procedure law based on Node.js. This systematic course takes criminal litigation activities as the research object, expounds the basic principles, basic systems, basic procedures and legal basis of criminal litigation, probes into the historical development and practical exploration of China's criminal procedure law, especially systematically combs the Marxist view of criminal procedure law. The theoretical teaching of this course includes six teaching modules: basic theory, litigation system, pretrial procedure, trial procedure, execution procedure and special procedure. Through the study of various courses in this system, students can comprehensively and systematically grasp the basic concepts, basic theories and specific contents of criminal proceedings, establish the concept of procedural rule of law, and improve their awareness of human rights protection. They are not only familiar with the legal

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provisions of criminal proceedings, but also have the ability to analyze and solve criminal proceedings, and can master the basic skills of public security organs in filing, investigating and using evidence to try criminal cases, so as to meet the needs of public security practice in the future.

2 KEY TECHNOLOGIES

2.1 Node.js

The Node.js is an open source and high performance runtime environment package based on JavaScript. Besides enabling JavaScript code to be implemented on the browser client, Node.js can also run on the back-end server, and even realize functions such as communication and file processing. Because of the emergence of Node.js, JavaScript has become the full-stack development language of applications from front-end development scripts, and compared with the traditional development methods, the built applications of Node.js respond faster and are easier to expand. The Node.js can not only request multiple data sources at the same time, but also customize different servers for the same data source, which has high flexibility. In this paper, the back-end design of the system is carried out by using the characteristics of single thread, asynchronous non-blocking I/O and event-driven of Node.js. (Wang, 2015)

2.2 Express Framework

The Express is a web application software development tool framework developed based on Node.js described above. With the advantage of Express Node.js, it is also favored by developers, because it has the advantages of rapid development, flexible expansion and quick use. The powerful functions of express include stable routing, dynamic view helper and redirection helper. Among them, the Node.js package manager, also known as NPM, can keep express in the dependency list and develop the basic template of Express by inputting only one line of commands without requiring developers to input too many codes. After the development of the basic template, you can quickly add other functions to build a complete application composed of Node.js server through a quick expansion mechanism. The main feature of express is that it simplifies the processing of HTTP request parameters and has a middleware mechanism to effectively control these HTTP request parameters. It also maintains the function of dynamically rendering front-end HTML

and supporting template engine that Node.js has. (Zhang, 2018)

2.3 NoSQL Database MongoDB

NoSQL database refers to a non-relational database, and there is no relationship between the stored data, which will be more conducive to expansion and more flexible. MongoDB is a typical nosql database with high concurrency, which can be used to meet the writing requirements of high-traffic data. Besides, mongodb is a flexible and independent distributed database, which stores data in different hosts. MongoDB is also a document database. In a common database, the basic unit of our operation is JSON (JavaScript Object Notation), while the basic unit of mongodb's operation is BSON strengthened on the basis of JSON, which uses document to organize and store data. (Zhu, 2019)

There are many similarities between MongoDB and traditional relational databases such as mysql, especially in data organization. The difference is that each database on mongodb server stores collection, while mysql is table. The record form of collection is displayed as document, and each document is separated and independent. Because it is a non-relational database, the coding step of declaring the field type is omitted, and the same field is not required to be the same type at the same time. The differences between MongoDB and mysql are shown in Table 1.

Table 1 Differences between mongodb and MySQL

MongoDB	MySQL
Database	Database
Collection	Table
Document	Row
Field	column

2.4 Development Environment

The knowledge learning system of criminal procedure law is developed by separating the front and back ends. The system chooses Linux CentOS7 version. The front-end design mainly uses HTML5+CSS3+JavaScript language, and uses Bootstrap framework to develop a responsive dynamic page that displays data in the browser. In the back-end server development of the application system, JavaScript language is used for development, and Node.js is used as the environment package. And the scripting language

writing tool of Node.js uses Visual Studio Code2019. Nginx load balancer can be used to ensure the rapid response of the server. The server adopts the relational database MySQL version 8.0.28. On the choice of the server, the mixed database of mysql and mongodb is adopted. Mysql can store relational data, such as the relationship data between students and teachers, and the user information and permission level that the system needs to set. (Wang, 2018) The non-relational database mongodb is used to store some more substantial large files, pictures, videos and other types of resources. When building a database server, after the driver package of each database is installed, it is necessary to use the normalization of tables as much as possible to achieve the purpose of reducing data redundancy and various abnormal situations of data operation. Of course, there will be cases of choosing the anti-normal table, such as some cases where the query efficiency needs to be specially optimized. In this system, the anti-normal table is used to realize the structured data operation function between teachers and students. However, when deploying mongodb database server, when setting keywords, it is necessary to avoid using `_id` keyword to accurately query the required content in order to make the query result error due to the same attributes of name, title and day. Through the introduction of the above key technologies, we have determined the overall environment for the development of the knowledge learning system of criminal procedure law, the configuration of related software and tools, and the technical feasibility of the overall project.

3 PROCESSREQUIREMENT ANALYSIS

3.1 Functional Requirements

Considering the different needs of different user groups, the knowledge learning system of criminal procedure law develops two types of user ports: teacher's port and user's port. Students' clients are required to record students' learning situation at all stages, and they also need to have the function of academic communication and interaction with teachers. The most important thing is that they can supplement their knowledge of criminal procedure law through online video courses. The characteristic function of the system is to simulate the trial function, and different student users can participate

in online interaction at the same time to deepen their knowledge and understanding of criminal proceedings. (Chang, 2021)

The main function of teachers' users is to select resources or make teaching resources, and submit teaching documents in the form of external links or uploading documents. Secondly, according to the completion of homework and the types of academic problems submitted by students, teachers give corresponding guidance and suggestions, so check the effect of online teaching and the overall learning situation. In setting the teaching content of the course of Criminal Procedure Law, teachers should highlight the foundation that is easy for students to accept, the practicality that is conducive to students' follow-up application, and the frontier of future discipline development. It is necessary to systematically ensure that during online classroom teaching by teachers, students can grasp the principles, systems and procedures of criminal procedure in time, and at the same time, they should keep up with the pace of the times and accurately grasp the latest situation of procedural law. Teachers can update the course content at any time, so that case teaching can keep up with current events and maximize practicality.

3.2 Overall Design

This system is designed based on B/S architecture, and adopts MVC mode, which divides the system into control layer, template layer and view layer for separate design. The system consists of three layers: display layer, business logic layer and data access layer. The display layer is the interface between teachers and students, users and application systems. It can achieve man-machine interaction between users and computers, show teaching courses, and display pages of various functional operations. The business logic layer is responsible for processing the data of teachers and students and the logic operation of business functions, including course resource management, user information management and statistical analysis of students' learning situation. The data access layer is used to realize the related functions of querying, adding, modifying and deleting data information of the system.

The model layer uses Modelproxy, the control layer uses Express, and the view layer depends on Handlebars. After the overall preliminary structure is established, you can start to configure package.json to unify the data language, and then execute `npm install`, and the system will automatically install the corresponding dependency packages. When all the

projects are configured, execute the command npm start to start the back-end service. The routing function of the system is controlled by router.js. The middleware of HTTP request parameters can provide interfaces to receive and forward all kinds of user requests, so as to realize the function of business processing. After the business logic module completes the operation task, the router module packages HTTP response packets and forwards them to the browser client to realize the request execution process. The server function of the system is realized based on Node.js and mysql in intranet. The key code of Node.js connecting to MySQL's database server is shown in Figure 1.

```

module.exports = {
  mysql: {
    host: '192.168.80.124',
    user: 'remote',
    password: '$#!.coM',
    database: 'leandb',
    port: 3306
  }
}

```

Figure 1: Code of Node.js connecting mysql server

access and calling the insertSubject method. The code of managing video courses is shown in Figure 2. The courses recorded and produced by teachers themselves need to be entered systematically by uploading files. The function of uploading files first requires the foreground to call loadSubjectData to load the established course data, and then calls loadCoursewareData method to request ajax to perform asynchronous interaction and access the interface to establish the data connection between the course data and video files. Then, through the submitUpload method, send a request instruction to the background uploadCourseware interface to complete the upload of video file resources.

```

conn.query(sql, function (err, docs) {
  if (err) {
    console.log("query failed.", err);
    return;
  } else {
    var subjectList = [];
    for (var i = 0; i < docs[2].length; i++) {
      subjectList[i] =
        {label: docs[2][i].name, value: {name: docs[2][i].name, id: docs[2][i].id, children: []},
        Varm: 0,
        for (var j = 0; j < docs[3][1].length; j++) {
          if (docs[2][i].id == docs[3][j].parentid) {
            subjectList[i].children[m] =
              {label: docs[3][j].name, value: {name: docs[3][j].name, id: docs[3][j].id}, m++};
          }
        }
    }
  }
}

```

Figure 2: Management course function code implementation

4 FUNCTION REALIZATION

4.1 Teacher Side

After the teacher logs in to the system through the employee number and the corresponding password, he can see that the main functional modules of the teacher are resource uploading, homework approval, learning situation viewing and personal information. The resources of students' learning courses, extracurricular exploration and other functional modules are designed and uploaded by teachers. According to the teaching plan and syllabus, teachers design the course content. Teachers can quote high-quality online courses by quoting external links, or they can make the same recording by themselves. The teachers need to classify and label the courses and manage the list of courses. Manage the teacher's course list, click the button to trigger the system's front-end method of loadSubjectData to load the data of each resource. During the loading process, the system accesses the back-end interface of the system's back-end server by way of post request through ajax to interact. When the data information of the management page is loaded, the function of teachers and users to add courses is realized by the system post requesting

4.2 Student Side

After logging in to the system through the account, students can see four modules: study course, extracurricular exploration, homework submission and personal information. The learning course module is the main course designed according to the syllabus. Theoretical teaching includes six teaching modules: basic theory, litigation system, pre-trial procedure, trial procedure, execution procedure and special procedure. When completing the content study in each class, the system will automatically jump to the homework submission page, and students can check the homework notices issued in each class to study the homework after class. The extra-curricular exploration is to supplement extra-curricular knowledge to the teaching of criminal procedure law. The initial user information is designed and entered when the school uniformly registers the account. The user can make a second modification. The core code of the creation statement taking the user information table as an example is shown in Figure 3. (Li, 2022)

```
CREATE TABLE `user`. (
  `id` int(11) NOT NULL AUTO_INCREMENT,
  `name` varchar(50) NULL,
  `age` tinyint(4) NULL,
  `class` varchar(50) NULL,
  PRIMARY KEY (`id`)
);
```

Figure 3: User information table creation code

The main body of the teaching module of this system is the video playing teaching module. This function module is implemented in such a way that users can watch videos stored and served online. The developer uploads the video to the server in the way of streaming, and the front-end player renders and watches it. This system refers to the play online of web player SDK technology provided by Aliplayer, and only needs to introduce this part of SDK configuration in the front-end code header file to realize online viewing of teaching videos. When students learn the relevant knowledge of trial of theft cases in online learning videos, such as the concept of theft cases, the constitution of crimes and the corresponding criminal liability laws, and watch the trial videos uploaded by teachers, they can click to enter the mock trial in the extracurricular exploration function module. When a teacher initiates a trial, students can choose the corresponding roles of investigators, criminal suspects, lawyers and paralegals, and learn and be familiar with the process of the first trial of a public prosecution case, that is, court hearing, court investigation, court debate, defendant's final statement, appraisal and sentencing. During this period, students can have a more intuitive feeling about the process of criminal proceedings, and can further grasp the corresponding rights and obligations of all parties involved.

5 CONCLUSIONS

In order to show the knowledge of criminal procedure in various forms, realize the efficient use of rich online resources and improve the interest of law students in criminal procedure knowledge, this paper designs a knowledge learning system of criminal procedure law based on NODE. JS, which provides an internet-based knowledge learning platform. The back-end system of the system adopts Node.js combined with Express framework to realize the function of JSON data interaction. At last, through the system test, the system can run normally, providing a new back-end solution for the

construction of online learning applications. Due to my limited research time, environment and ability, there are many shortcomings in this system, which need the help of relevant personnel to improve it. For example, the number of servers in the system is limited, and when as many as 100 users jointly issue instructions, the concurrency of the system is insufficient. At the same time, this paper only studies the PC system, but not other devices, so it is difficult to provide more convenient and fast services. Subsequent improvements can be made, mobile services with a wider audience can be designed, and data interoperability of port-like platforms can be realized to make the services of the platform more perfect.

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