

# Research on university scientific research patent management information system based on BS mode

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**Abstract.** The development of this system is based on ASP technology, and through the application of B/S structure and SQL Server database, it provides necessary scientific research data support for the sharing of scientific research information in colleges and universities, and basically realizes the management of personnel files, personnel management and professional title. Management integration of scientific research projects and management of information systems. Develop a research goal of web-based network research management information system. Through this system, it can manage and standardize more scientific research projects. The system is a complete set of college plans, declarations, contracts, Research management information systems for results, patents, funds, personnel, equipment, etc. The system is based on the B/S mode, perfecting the output system of the report, and providing corresponding data support for the smooth development of scientific research projects, providing a solid material foundation and software hardware for the research and management of scientific research projects. Support, providing an electronic data platform for scientific research and academic exchanges, successfully achieved design tasks and goals.

**Keywords:** University scientific research patent management, BS mode, ASP technology, SQL server database, information system design

## 1. Introduction

With the continuous development of scientific and technological innovation and economy, China's higher vocational education has developed rapidly. Various types of higher vocational colleges at all levels have provided a large number of professional and technical talents support for China's economic development, industrial upgrading and economic transformation, and have made great contributions to

regional economic development [1]. The rapid development of higher vocational education, on the one hand, provides a large number of professional and technically applicable talents for China's economic development; on the other hand, the research strength is weak, and the scientific research institutions are not perfect, especially the higher vocational colleges with new upgrades are not set. Scientific research institutions, this situation needs to be reformed and improved. It is necessary to further strengthen the establishment of scientific research management institutions, improve the scientific research management system, provide theoretical support for the stable, high-speed and healthy development of higher vocational colleges, strengthen scientific research

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management, and provide scientific research support for the construction of vocational education majors. With the rapid development of China's economy, the state's investment in scientific research is increasing, which provides an opportunity for the development of scientific research in universities. Scientific research has gradually become an indispensable task in the basic work of college teachers [2]. Almost all teachers in colleges and universities have undertaken certain scientific research tasks. The scientific research results of teachers are directly linked to the professional title evaluation and performance appraisal of teachers. The strength of ability directly reflects the academic ability of teachers and the level of education and teaching [3]. The number of scientific research work in universities is huge, the number of participants is large, and the research scope is wide. This increases the difficulty of scientific research management in colleges and universities, the collection of scientific research information in higher vocational colleges, the declaration of scientific research achievements in universities, and the utilization and transformation of scientific research results. It puts forward higher requirements for the scientific research management of higher vocational colleges [4]. Relevant departments must be able to effectively realize the processing, processing, aggregation, integration, and safe storage of scientific research information of colleges and universities. It is necessary to scientifically and standardize the scientific research management of colleges and universities. Conduct information system management.

Judging from the actual situation of the development of scientific research management in colleges and universities, college teachers have a greater responsibility in the specific scientific research management, and more staff participate in scientific research. Most of the teachers in the scientific research management are the scientific research projects they are responsible for. The information is reported to the college [5]. The specific content is basically related to the research topic, funding, personal data, scientific research achievements and so on. Scientific research management should collect and organize these materials, and link with professional title evaluation, teacher evaluation, project management, and university evaluation to promote the all-round development of higher vocational colleges.

In order to meet the needs of colleges and universities in the development of scientific research, colleges and universities based on the actual development of

the school, using ASP technology, actively built a set of scientific research management information system based on network information technology. Scientific research management information system is an important manifestation of the network management of scientific research work in colleges and universities. It improves the efficiency of scientific research management in colleges and universities, facilitates the timely updating of various scientific research information, is convenient and effective, and builds a scientific research management exchange. A good platform. Based on the B/S mode, improve the input and output system of the report.

## 2. System key technology introduction

### 2.1. ASP overview

#### 2.1.1. The main concepts and characteristics of ASP

As a technology for web-based development of applications, ASP technology was developed in the middle and late last century, and was launched by Microsoft. According to Microsoft, it built a platform that is flawless, and in its company. The text also introduces ASP as a scripting environment that can be used well in servers. ASP can be used to perform high-performance, interactive, and dynamic generation and execution of related server programs.

One of the most important features of ASP is the ability to unify elements such as components, scripts, and HTML so that you can develop an application that runs on the relevant server and can be based on customer needs. A specially crafted full HTML page is passed to the client, which gives you a good access to the database ASP. In terms of its type, ASP is a server-side technical means that should be part of the ActiveX technology category. Therefore, it has some differences with the related technical means and tools such as JavaScript, Active X Control, Java, etc., which can be used for dynamic homepage display on the client side. All command script statements owned by ASP need to be interpreted by the server. And execution, and after the execution, the corresponding HTML page generated by this result can be transmitted to the browser [6].

#### 2.1.2. ASP advantage

- ASP no longer interprets the program on the fly, compiles when the program runs for the first time, and runs on the server, and uses a common

language program to improve the efficiency of execution.

- The language of ASP is also independent. Therefore, when writing a program, it can be written according to the user's own hobbies. Similarly, some users can write their own programs in different languages. C language, VB language, etc. are ASP "customers", multi-language use can better play the functions of COM+development programs, protect data and complete transfer of ASP.net.
- On the client side, only the dynamic web page file output by ASP is seen, so that the source code can be effectively protected, and the security performance of the program is increased.
- The client's script can be obtained by using the script of the server. Object orienteer's object-oriented capabilities extend the components of the server. ActiveX Server components can be written in multiple languages and can be extended.

## 2.2. Introduction to SQL

SQL is a structured query language. Its main function is the application on the database, which enables the database to establish contact and exchange data. The US language uses the SQL language as the standard language for the management of relational databases [7]. The SQL language can do many things, such as updating data in the database, extracting data from the database, and so on. Nowadays, common databases, such as access, Microsoft, etc., are managed by the SQL language, but different data has some expansion and change for the SQL language according to their own requirements. Today's SQL language has many different operations, but the standard delete means delete, create creation, select selection and other basic languages, which can be used in various databases.

## 2.3. Introduction to B/S structure

In the existing managed information systems, there are two commonly used modes, mainly C/S mode and B/S mode. B is an abbreviation for English browser, and C is an abbreviation for customer, client word. These two modes have their own advantages and disadvantages, but also have their own rules of use. Client, server, middleware, and server management are the contents of the C/S model, which is the client's application, program, and intermediate group components. The system user interacts with the data by

using the client, which is the client's application. The server's job is to effectively manage the system resources, and the middleware is used to connect the client application with the server. The intermediate component enables the user. Perform effective query data and management data. The C/S model has strong interactivity and its data is relatively safe, because the network has a small amount of circulation and a faster speed. However, C/S is not able to perform platform spanning operations, so it is difficult to adapt to the rapid discovery of computers today. The C/S system has high maintenance requirements, low plasticity performance, and is easy to cause redundancy and waste of resources. Its closed characteristics also make it difficult to communicate with other systems. It is difficult to establish a sound information network, and the B/S mode is born. It is based on these problems of C/S.

## 3. System design analysis

### 3.1. System architecture design analysis

The modern enterprise information management system architecture model mainly considers the C/S mode and the B/S mode. C/S is the client/server (client/server) structure. It is a well-known software system architecture. By assigning tasks to the client and server, the communication overhead of the system is reduced [8]. You need to install the client. Manage operations. The client and server programs are different. The user's program is mainly on the client side. The server side mainly provides data management, data sharing, data and system maintenance, and concurrency control. The client program mainly completes the user's specific business. Development is easier and easier to operate, but application upgrades and client program maintenance are more difficult. The three-tier C/S architecture is shown in Fig. 1.

The B/S structure, the Browser/Server structure, is a change or improvement in the structure of the C/S with the rise of Internet technology. In this structure, the user interface is completely implemented by the WWW browser. The client basically has no dedicated application, and the application is basically on the server side. Since the client does not have a program, the application upgrade and maintenance can be completed on the server side, and the upgrade and maintenance are convenient. Since the client uses a browser, the user interface is "rich", but functions such as printout of data are limited [9].

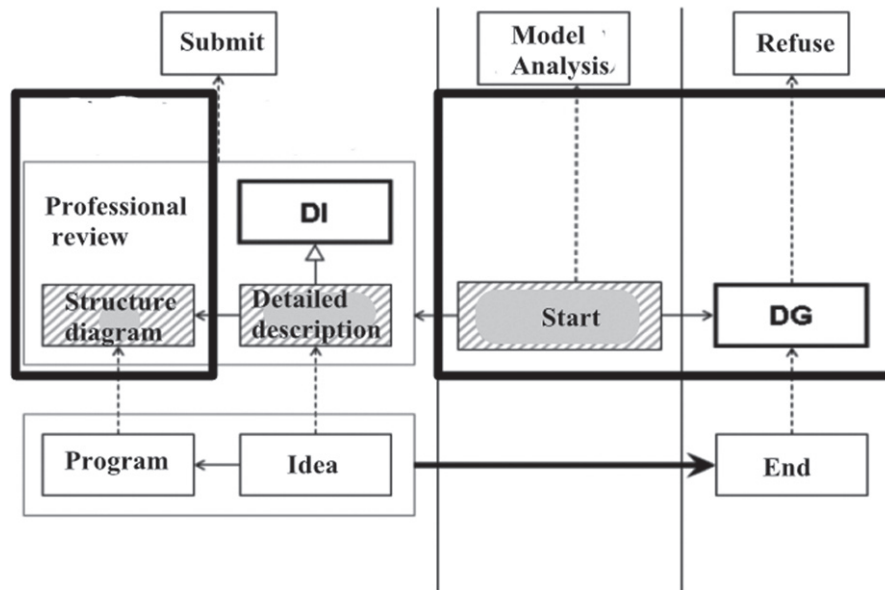


Fig. 1. C/S architecture diagram.

### 3.2. System module

This research information management system consists of five parts: forwarding server, client software, directory server, database server, and backup database server.

- When there is a client query information, the directory server will specify a forwarding server to the client software, through which the forwarding server provides the required information data to the database server. Ensure that customer inquiries can be processed in a timely and accurate manner.
- The client software implements tools for users to view information, post information, and search for information, that is, the user operates the software, and the others run in the background.
- Each module of the system is automatically registered with the directory server after it is started, and remains connected. Used to respond to user information verification and background maintenance of the entire system.
- The storage includes the teacher information, the basic information of the thesis, and the basic information of the school is stored in the database server, which is convenient for additions, deletions and changes.

- The backup database server is synchronized with the database server. When the database server fails, it can be replaced to prevent information loss and cause huge losses.

### 3.3. System module division

As a platform for information exchange for teachers, the technology information management system client determines that the client's functions are comprehensive, and it is convenient for users to meet user needs. Its functional modules are divided as shown in Fig. 3 below:

- Call the shared service. Considering the global situation of the digital campus, following the unified rights management model, using a unified permission service to support application service calls. First, the services provided by the shared data center, such as the single sign-on service, the personnel information service provided by the personnel management system, etc., are invoked.
- Personal information management. The personal information management is mainly assigned to the use of personal roles, and the content includes the information of the individual information, the application for information modification and the information viewing function. See in Fig. 2.

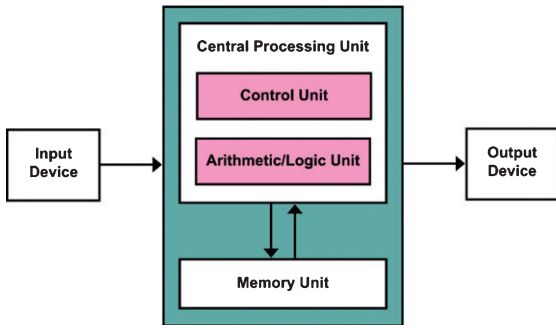


Fig. 2. System architecture diagram.

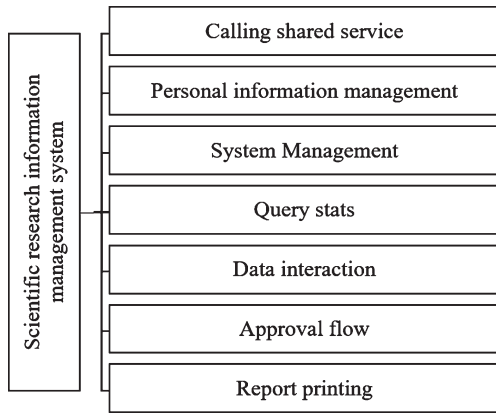


Fig. 3. Schematic diagram of the division of the functional modules of the technology information management system.

- System Management. It mainly configures user information, scientific paper information, patent information, work information, conference information and approval information of various scientific and technological achievements in the system.
- Query stats. The query statistics module can query and count all kinds of scientific research information and print the report. The functions mainly include inquiring according to the information of the college, personal information, school information, research direction information, research project information, etc., and can complete the research completed in a certain period of time. The results are statistically compiled and the results printed to facilitate the verification of information at the hospital and school level administrators [10]. As shown in Fig. 4.
- Data interaction. The structure of the data interaction module is divided into three layers. The database access layer is used to establish and manage the connection with the source database and the target database, complete the read and write operations on the source database and the target database, and send the result data as a file to the file. Data exchange layer; the data exchange layer is responsible for completing the information conversion from the source database to the target

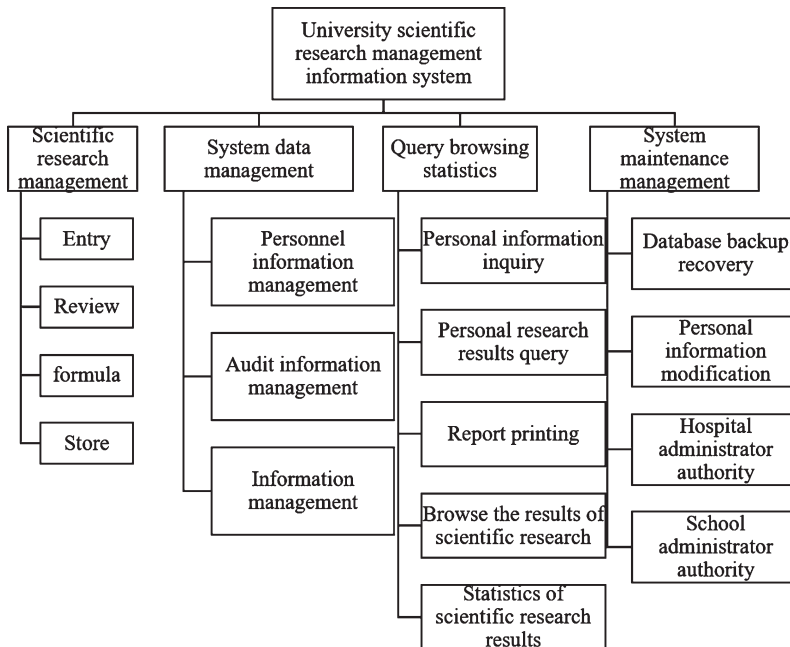


Fig. 4. Construction management system function module construction diagram.

database; the information management layer is responsible for providing a user operation interface, receiving and managing data information and configuration information registered by users at various levels.

- Approval process. The module design is carried out according to the approval process of the scientific paper, so that different operations of different personnel in the approval process can be realized in the approval process.
- Print the report. The report is printed by writing the data to Excel.

#### 4. Detailed design of scientific research information management system

At present, the scientific research information management work of colleges and universities

urgently needs a new efficient and safe operation mode. Therefore, it is very necessary to use the scientific research management system to solve the cumbersome scientific research information management work, if it is the inevitable choice for the rapid development of the information society. The system can realize information sharing, real-time, transparent, comprehensive, secure and convenient. This not only reduces the workload of managers, but also provides a good platform for communication and improvement for the entire school work.

#### 4.1. Data interaction module design

##### 4.1.1. Structure of the data interaction module

The structure of the data exchange module is divided into three layers, including the database

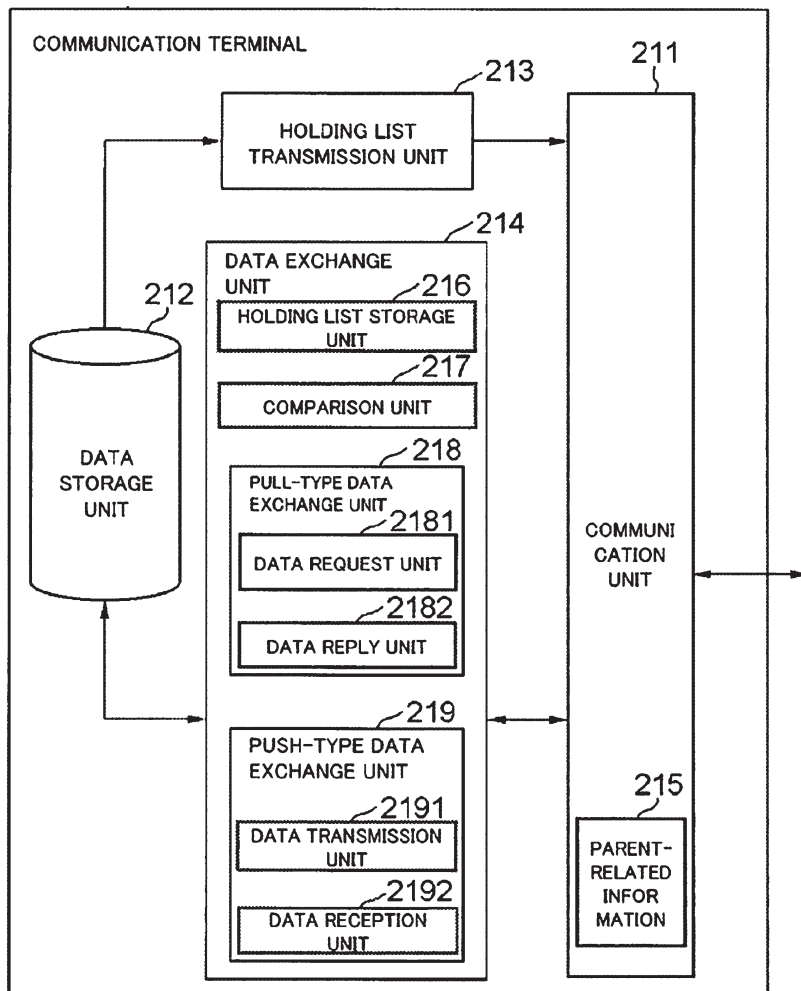


Fig. 5. Schematic diagram of data sharing.

access layer, the data exchange layer and the information management layer. Each layer provides services for its upper layer, and the next layer is transparent to the upper layer, as shown in Fig. 5.

The structure of the data interaction module is divided into three layers. The database access layer is used to establish and manage the connection with the source database and the target database, complete the read and write operations on the source database and the target database, and send the result data as a file to the file. Data exchange layer; the data exchange layer is responsible for completing the information conversion from the source database to the target database; the information management layer is responsible for providing a user operation interface, receiving and managing data information and configuration information registered by users at various levels.

#### 4.1.2. Information management design

The information management layer mainly implements the following functions: (1) data management, addition, deletion, and modification of data source information, data group information, addition, deletion, and review of audit data group information, and addition, deletion, and change of shared data items. (2) Configuration management, increase the update page configuration information. (3) Authority management, permission control of addition, deletion and change of user information.

#### 4.1.3. Data exchange layer design

The information management layer submits the data information and the configuration information to the data exchange layer, and the data exchange layer

dynamically generates the mapping file according to the file information. Then generate a database query statement by parsing the mapping file and submit it to the database operation layer. Finally, by parsing the file submitted by the database operation layer, a database update statement is generated, and the statement is submitted to the database operation layer.

#### 4.1.4. Database access layer design

The data exchange layer submits the database connection parameters and SQL statements to the database access layer. The database access layer establishes a connection with the database and performs a database access operation to return the operation result to the upper layer. If an error is encountered during the operation of the database or an exception is thrown, the current transaction can be rolled back and an error message is returned to the upper call function. As shown in Fig. 6.

#### 4.2. Privilege management module design

Rights management is a very important part of a web application. If you do not establish rights management, any “illegal user” entry system can use any function in the web application project, which is very dangerous for the system. A suitable authority management, each operation or each user should be assigned different operation rights, and should have the scalability that software development should have, that is, each function item, according to the different wishes of users with different rights Add any function or delete function to each type of user role.

In this system, rights management is mainly for ordinary teacher users, college administrators, school administrators, and system administrators. In order to enable users at all levels to obtain corresponding access information, different roles are assigned to different users, and different roles have different operation interfaces. After the user logs in to the system, a response menu is generated according to the role to which the user belongs, so that the user After logging in to the system, you can only perform system operations through the permissions of the person’s role. This ensures the safe use of the system and enables separate management at each level [11].

#### 4.3. Information audit module design

In the scientific research information, the user first submits various scientific research data through the system management function, and then submits and

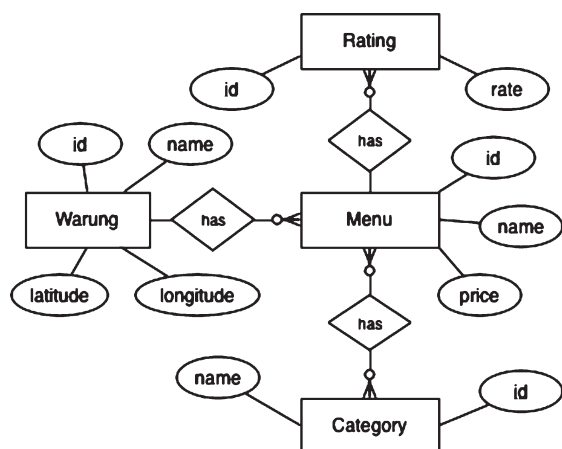


Fig. 6. Associated information map.

enters the system, and the scientific research instance enters a state of waiting for review. The status of scientific research data in the review process is not constant. We have added state variables to the scientific data class in the system to identify the current state of the scientific research instance, and control the scientific research instance in each state through the control of the ASP page. The system functions that can be used to achieve control of the process. After logging in to the system, people in four different roles can see different function entries, that is, different users have different operation rights. The list of role functions is shown in Tables 1 and 2.

It can be seen that these so-called “permissions” are completed by multiple system business functions. Among these rights, some functions only complete the addition and modification services related to scientific research information, and some functions,

such as advanced modification and advanced query, will change the scientific research examples. status.

#### 4.4. Database design

After the module design of the whole system is clear, the data is designed and integrated by integrating and reconstructing the data of each module in the system. The database is developed in a specific environment, and it is formed into a database module to establish its application system to solve the user’s needs in this regard. The database table is the most important part in the whole system design process. In designing the table, not only the general requirements of the database, but also the design of the data table can be completed on the basis of the user’s needs. Practical characteristics. The quality of the design of the database is directly related to the efficiency of the operation of the scientific research system of the department. In this system, we use SQL Server 2005 as a tool for background data management. The adoption of this tool is based on the actual application of the system.

The construction of a database in system design work is a very important content. If the database is missing, then this system has no effect. Therefore, it is especially important to pay attention to the design of the database. For its design, this article describes the following:

Charge unit code, the chronology table, which is the Charge unit code, can store the specific data of the competent unit, and the number Id represents the primary key, which is an identity column, and the department unit belongs to the charge\_ unit\_ name. Table 3 for the specific design of the faculty table.

Because the database of this system includes a wide variety of forms, this article will take four of them as examples, while other tables are very similar to the four, and are no longer listed. The tables covered in the academic report include: faculty tables, scientific and technical information scales, subject category classification tables, and publication periodic tables. The table included in the school information form is:

Table 1  
Introduction to the built-in objects of ASP

Object	Specific function
Request	Obtain relevant data information from the user side
Response	Supply this data to the client
Server	Supply some web server application tools
Session	Store user data in a Swsson, only that user can access
Application	Each client can share information through ASP-Application
Object Context	Handling related distributed transactions with the server Microsoft Transaction

Table 2  
List of general teacher permissions

Functional description	Can change research results?
Text-based results query	no
Submit text results	no
Patent information inquiry	no
Submit patent information	no
Reward information inquiry	no
Submit reward information	no
Result identification information inquiry	no
Submit results identification information	no

Table 3  
Department table

Column name	Primary key	length	Allow empty
Id	Yes	4	no
Charge_ unit_ name		30	no
Column name	Decimal places	Type of data	Identification
Id	0	Int	Yes
Charge_ unit_ name	0	Nvar char	no



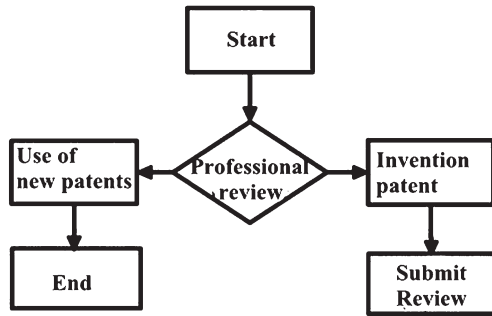


Fig. 7. Diagram of the various tables involved.

the faculty table. The table of special talents includes: school information sheets and special talent categories. The table involved in the scientific research management organization table is: school information table.

The discipline development table includes: an annual table and a subject table. Then you can construct the primary foreign key relationship in the structure hierarchy of these tables. The relationship between the tables of the system database is shown in Fig. 7.

## 5. Conclusion

This paper mainly studies how to implement B/S scientific research management system and design it. The development of this system is based on ASP (Active Server Page) technology, and through the application of B/S structure and SQL Server database. The B/S scientific research management system basically satisfies the requirements for scientific research management and networked the system. Its characteristics include: complete record of information and record science; in the application of the database, research and maintenance of the subject is upgraded; scientific management personnel reduce the management of data; provide an electronic platform for operation and communication, Conducive to the exchange and use of researchers and managers. In this paper, the design of the database, the information entered, the modification of the system, the query

and other functions are the focus of the research. After many tests, the system can basically meet the requirements of users, so that work efficiency can be improved, the level of postgraduate management is improved, and the research work of the college is promoted.

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