

Research on software system development and practical application based on SpringBoot + Vue

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Abstract. This system completes the design and development of student internship and training system through several steps: development environment construction, database design, system design and development. The system adopts SpringBoot + Vue which is a front and rear end separation architecture, and the database system adopts MySQL 5.7. The security framework adopts Shiro framework for system development. For the system development, this paper expounds the process of system development and how to realize the system function through the code, gives the implementation code of some port functions, and expounds the front-end page design, program design architecture and the real and modern code of data security verification in the process of system development. The front and rear end separation mode not only shortens the system development time, but also enables the front and rear end personnel to give full play to their own advantages and develop beautiful high-performance systems.

Keyword: Internship and practical training system, SpringBoot, Vue, Mysql.

1. System architecture

The student internship and practical training system based on SpringBoot + Vue adopts the most popular SpringBoot + Vue front-end and back-end separation architecture, the database system adopts MySQL5.7 version, and the security framework adopts Shiro framework.

1.1 Client

The client uses Vue + element-ui to develop the system interface, Vue.js can provide efficient data binding and flexible component system through simple API (Application Programming Interface). Vue framework has the advantages of lightweight, two-way data binding, componentization and virtual dom. Compared with the traditional react framework, Vue framework has better performance and faster operation speed, meets the original intention of developing the system and makes the system easy to use.

1.2 Server side

The server side uses SpringBoot framework for system background development. SpringBoot framework is the encapsulation of Spring and SpringMVC framework, which has the common advantages and features of both. On this basis, it simplifies the tedious configuration process of both, and almost zero configuration can be developed. It achieves the effect of "out of the box", shortens the development cycle of the system, and meets the economic and technical feasibility.

1.3 The persistence layer

The persistence layer framework of the system adopts the mybatis framework, which extracts the operation of traditional JDBC connecting to the database and decouples the database connection process. When connecting to the database, there is no need for cumbersome operation. Just place the SQL statement in the corresponding XML file, which can simplify the process of interacting with the

database, improve the system performance and prolong the system life cycle, reduce the burden on system developers.

1.4 Database system

The database system uses MySQL5.7. MySQL is the most commonly used database for the system development of small and medium-sized enterprises. It provides a variety of database storage engines, supports cross-platform operation, has the advantages of small size, fast speed, low total cost of ownership, open source code, and can realize fast connection through the use of optimized single scan and multiple connections. When connecting to the server, the Mysql database transmits the password in the form of encryption, thus ensuring the security of the database and meeting the development requirements.

1.5 Security framework

The system uses Shiro security framework to ensure the security of the student internship and training system. The main role of the system is user login to verify user identity and user authority, that is verify whether a user has the authority to access a function. Session management is a session after the user logs in. Before the user logs out this time, all his information is in the session. Data encryption, such as the password of the system user, is stored in the database through MD5 encryption technology rather than inscriptions. This framework is used to protect the information of students, schools, teachers and enterprises and improve the security of the system.

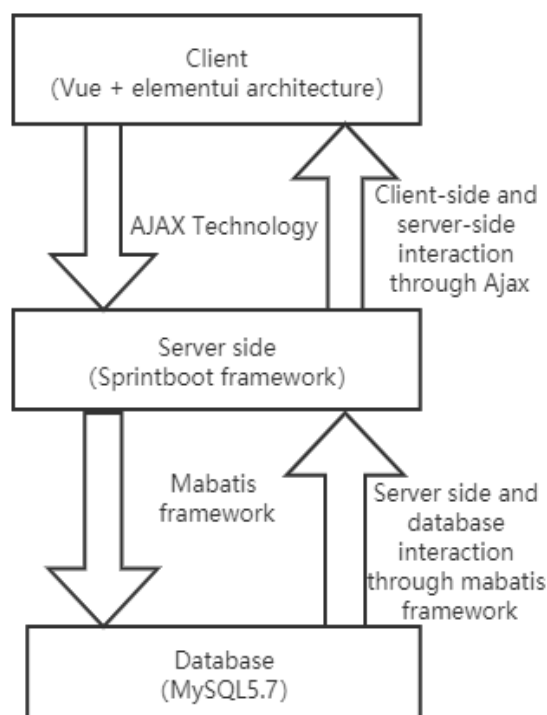


Figure 1. System operation flow chart

2. Demand analysis

According to the actual needs of teachers, students and enterprises in the process of practice and training, and the function of each module of the subsystem is subdivided, striving to be comprehensive, efficient and convenient.

Students login can view personal basic information, edit and upload resume information, view enterprise and recruitment information, send resume, message, etc. Teachers can log in to view personal basic information, view students, enterprises and recruitment information, upload students' actual plans, supervise and manage students' practice progress, view students' practice and training reports, etc. Enterprise login can modify enterprise information, release recruitment information, accept students' resumes, release interview invitations to students, initiate conversations to students, etc. The login of the management terminal can manage all user information, manage forums, release practical courses, etc.

3. Database design

According to the expected function and demand analysis results of the system, the database design is used to integrate information resources, realize the efficient management and convenient access of relevant information in the process of student practice and training, and lay a foundation for the subsequent information system development.

The database design process follows the basic process of database design, after the clear requirements, the E-R diagram design is the main, abstract the entity and the connection between the entity and the entity, that is, firstly abstract a single local view, and then connect the single view to form a global view. Among them, the main entities are students, teachers, enterprises, training report, internship report, recruitment information, resume information, forum, internship progress, internship plan, notice and announcement information, evaluation information, colleges, majors, a total of 14 entities. At this point, the work of database conceptual structure design is basically completed. Next, the conceptual data model, known as the E-R diagram, is transformed into a logical data schema suitable for the Mysql database management system environment. According to the logical structure model and the storage structure, storage mode, access path of Mysql database, select the appropriate database physical storage structure, with the help of the appropriate database language, such as DDL, establish the database table, complete the database table structure design. Finally, import the data, take the design of the completed operation and testing work.

The database mainly includes student table, enterprise table, teacher table, recruitment table, notice and announcement table, resume table, class schedule, internship plan table, internship report form, training report form, evaluation information table, school table, professional table, forum speech record table. And in order to facilitate retrieval, adapt to the system needs and ensure the integrity of the database and design of student-recruitment table, student-course schedule, enterprise-resume table, role table, user table, role - user table, a total of 20 tables.

The database table structure design takes Table 1 as an example.

Table 1. Record of forum speeches

Field name	Meaning	Data type	length	Allow null value	Primary key
Forum_id	BBS number	Int	10	False	True
Student_id	Student no	Int	10	True	False
Teacher_id	Teacher's number	Int	10	True	False
Forum_talk	Speech content	Varchar	1000	True	False
Talk_time	Presentation time	Date & time	10	True	False
Talk_good	Give a like	Int	50	True	False
Talk_bad	Report	Int	50	True	False

4. Realization of system functions

System function development is mainly divided into client development, server development and database development.

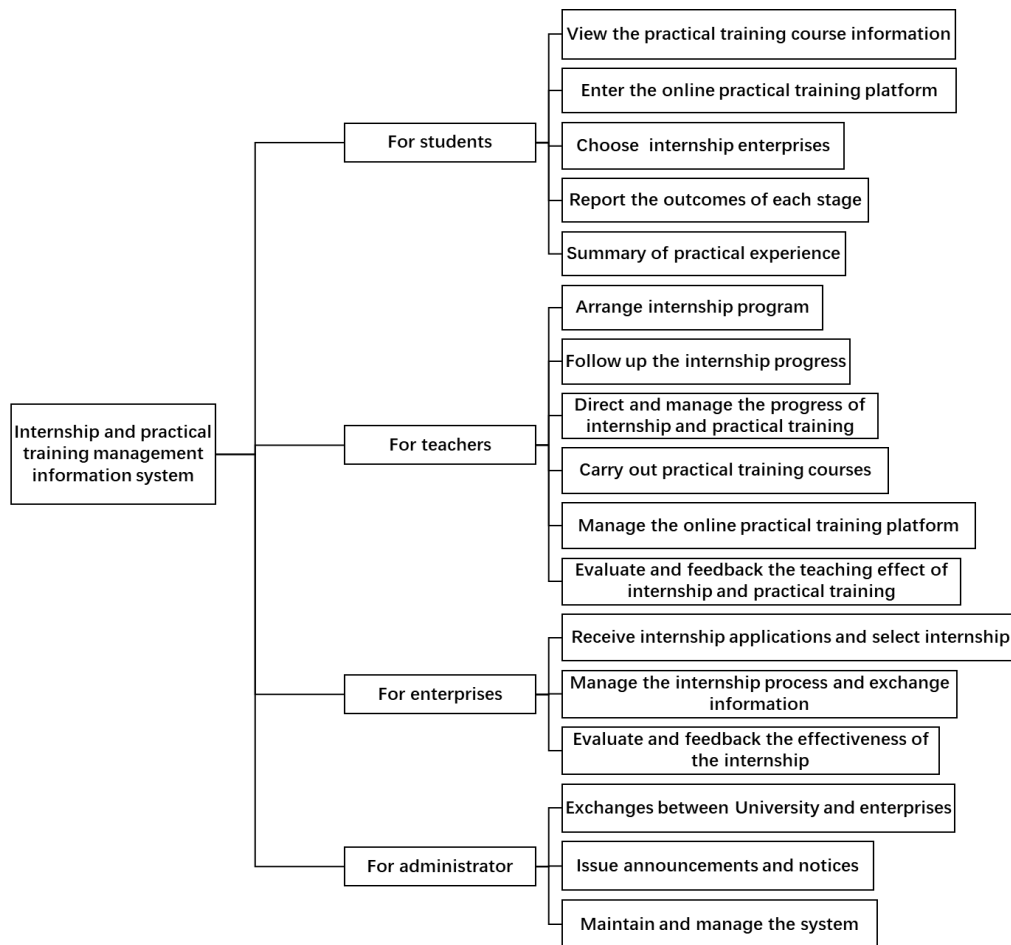


Figure 2. System Functional architecture

4.1 Take the registration function of the system login interface as an example

After inputting the account password in the login interface, the system sends the account password to the controller layer through Ajax. The controller layer calls the service layer, and the service layer calls the Dao layer to interact with the database to query whether the account password inputted by the user exists in the database. The client presents the login and registration form and shadow effect through the nesting of blocks, the specific interface and key codes are as follows:

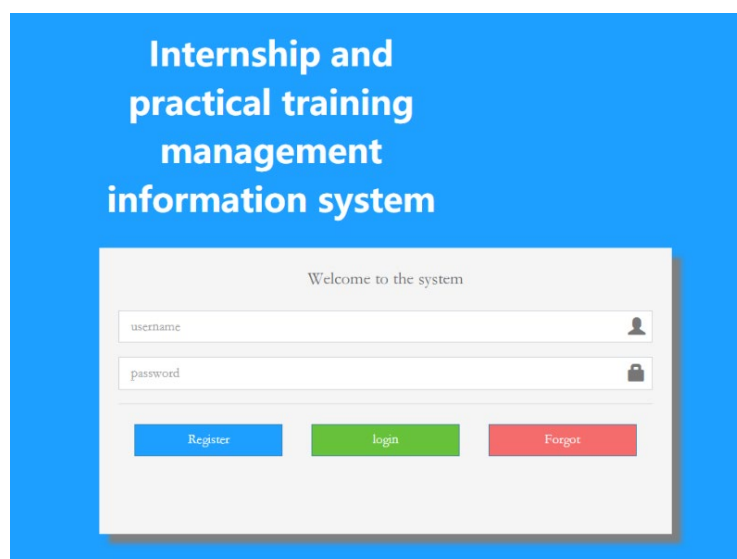


Figure 3. Login interface diagram

Client-side critical code:

```
methods: {  
  refreshCode: function () {  
    this.src = "captcha.jpg?t=" + $. now ();  
  },  
  login: function (event) {  
    var data = "username="+vm.username+"&password="+vm.password;  
    $. ajax ({  
      type: "POST",  
      url: "sys/login",  
      data: data,  
      dataType: "json",  
      success: function(result){  
        if(result.code == 0){  
          parent.location.href ='index.html';  
        } else {  
          vm.error = true;  
          vm.errorMsg = result.msg;  
  
          vm.refreshCode();  
        }  
      }  
    });  
  },  
},
```

Server-side key code:

```
@ResponseBody  
@RequestMapping(value = "/sys/login", method = RequestMethod.POST)  
public R login (String username, String password) {  
  try {  
    Subject subject = ShiroUtils.getSubject();  
    UsernamePasswordToken token = new UsernamePasswordToken(username, password);  
    subject.login(token);  
  } catch (UnknownAccountException e) {  
    return R.error(e.getMessage());  
  } catch (IncorrectCredentialsException e) {  
    return R.error("The account or password is incorrect");  
  } catch (LockedAccountException e) {  
    return R.error("The account has been locked. Please contact the administrator");  
  } catch (AuthenticationException e) {  
    return R.error("Account authentication failed");  
  }  
  return R.ok();  
}
```

4.2 Take the function of publishing recruitment information on the enterprise side as an example

After logging in the system, the person in charge inputs the relevant enterprise information in the specified location of the module. After clicking publish, the enterprise information is sent to the server through Ajax technology. The server executes insert statement to insert the enterprise information into the database recruit_ Menu table. After students log in, click the recruitment module, and the system executes the select query statement to transfer the enterprise information in the table to the

client layer by layer. The client mainly uses < el table > tag nesting in element UI to present data, < el dialog > and < el form > tags to realize the pop-up function of adding and modifying recruitment information in the form of form. With the hierarchical nesting of < div >, < span >, < template > and other tags and related attributes, the client presents a beautiful and concise page. The specific interface and key codes are as follows:

Figure 4. Recruitment information

Client-side critical code:

```
methods: {
  onSubmit() {
    console.log('submit!');
  },
  open () {
    this.$confirm('Are you sure to save?', 'reminder', {
      confirmButtonText: 'ensure',
      cancelButtonText: 'cancel',
      type: 'warning'
    }).then (() => {
      this.$message({
        type: 'success',
        message: 'save successfully!'
      });
    }).catch (() => {
      this.$message({
        type: 'info',
        message: 'Unedited'
      });
    });
  },
}
```

Server key code:

```
@GetMapping(value = "/list")
public Map<String,Object> list(int pageSize,int pageNumber) {
  Sort.Order order=new Sort.Order(Sort.Direction.ASC,"price");
  PageRequest page=PageRequest.of(pageNumber,pageSize,Sort.by(order));
  return companyService.findByPage(page);
}
```

Key SQL statements:

```
" insert into companyrecruitment values (" +positionname+", " +companyname+", "
+companyaddress+")"
```

4.3 Taking the function of student screening recruitment information as an example

Students input the keywords in the screening interface, click the button named filter and pass them to the controller layer through Ajax. The controller layer passes the keywords to the service layer for logical processing. The input keywords are synthesized into an SQL statement which is passed to the Dao layer for data query, and then returned to the client for display through SQL splicing technology. The client also realizes specific functions with the help of corresponding predefined tags. The main function of this page is the realization of various filtering functions. The specific interface and key codes are as follows:

company-address			job-introduction	company-intro	
province	city	address			please input the job-name b
HeNan	JiaoZuo	BeiJing	perform data analysis and provide report	It has been open ten years and heated with the school three years	send your resume leave words
ShangHai	ShangHai	122 ZhongShan Road, Shanghai	Formulate employee training and development plan according to the investigation and analysis of the company's existing management, technical ability and training needs	Culture technology mainly uses technology means to meet company needs	send your resume leave words
BeiJing	ChaoYang	78 DongShan Road, ChaoYang District, BeiJi	Investigate and study the current management situation	Culture technology mainly uses technology	send your resume

Figure 5. Students browse recruitment information

Client key code:

methods: {

```
filterHandler(value, row, column) {
    const property = column['property'];
    return row[property] === value;
},
```

```
handleChange(file, fileList) {
    this.fileList = fileList.slice(-3);
},
```

```
handleRemove(file, fileList) {
    console.log (file, fileList);
},
```

```
handleExceed(files, fileList) {
```

this.\$message.warning(`\${files.length} is selected. A total of \${files.length + fileList.length} files are selected`);

```
});
```

```
},
```

```
beforeRemove(file, fileList) {
    return this.$confirm(`Sure to remove ${file.name}?`);
},
```

```
},
```

Server-side key code:

```
String sql="";
```

```
String positionname = (String) params.get("positionname");
```

```
String salary = (String) params.get("salary");
```

```
String address = (String) params.get("address");
```

```
if(positionname!=null) sql+=" and name like '%"+ positionname
```

```
+'%&apos;";
```

```
if(salary!=null) sql+=" and component like '%"+salary+"%&apos;";
```

```
if(address!=null) sql+=" and indication like '%"+address+"%&apos;";
```

```
companyinfo=sysCompanyDao.querycompany(sql);
```

5. Conclusion

This paper discusses the design and development process of student internship and practical training system. Starting from the framework and technology adopted, this paper introduces SpringBoot + Vue front and back end separation architecture, Mysql database and Shiro framework application in the actual development process in detail, which shows the flexibility and plasticity of the technology under specific and changeable user needs.

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