

Design and realization of 5G mobile base station's inspection report and management system

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Abstract: With the development of global mobile Internet, more and more mobile communication base stations are constructed and put into use, then the construction quality of mobile communication base stations and the radiation impact on the surrounding will become a non-important thing. For this reason, this paper gives a complete set of information management program in the field of radiation detection report of mobile base station.

This system is realized by using Java related technology, and the main product form is Java Web software product. In order to quickly and lightly develop the source code, the system uses the industry's more popular third-party framework SpringBoot, data storage software tools and MySQL database. Through the Java technology framework Mybatis we realize the connection between the running program and the database. The front-end uses the template technology of FreeMark framework to write FTL template files, and combines with the JS framework LayUI to quickly realize the page.

Keywords: 5G mobile base station; information management; Java; SpringBoot

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I. The significance of this paper

In recent years, the fifth generation of mobile communication system, 5G, has become a hot topic in the communication industry and academia, and the development of 5G is also due to the increasing demand for mobile data. With the development of mobile Internet, more and more devices are connected to the mobile network, and new services and applications are emerging. There are two sides of the coin. While we enjoy the convenience brought by 5G communication technology, we cannot pay attention to the radiation hazards it brings to us. The main pollution factor of base stations is electromagnetic radiation, which has a certain impact on our ecological environment. By checking some information on the Internet, we found that for the radiation impact around the base station need to use strong investigation, continuous monitoring, analysis, analogy and then calculated to get the impact of electromagnetic radiation on the environment data. The process is more cumbersome and these data and information can not be timely receipt and management, time-consuming and laborious. Therefore, the electromagnetic environment supervision and management system for 5G mobile communication base station needs to be developed urgently, so that the electromagnetic environment around the base station can be supervised and effectively managed in real time, which can not only realize the openness and transparency of the electromagnetic environment information of the base station and reduce people's anxiety and fear of electromagnetic radiation, but also improve the efficiency of the relevant management personnel, and they can query the information data at any time to understand the electromagnetic radiation situation around the base station. At the same time, it can also improve the work efficiency of the relevant management personnel, who can always understand the electromagnetic radiation situation around the base station by searching the information data, so as to manage and supervise the radiation situation around the base station, and save some human and material resources.

II. This system contains four types of users

1. Administrator, including the following functions: login; logout; personal information management; testing type management; testing equipment management; testing unit management; commissioned unit management; system user management.
2. Entrusted units, including the following functions: login;logout; personal information management; base station information management.
3. EIA unit, including the following functions: login;logout;personal information management; test report management; report details management.
4. Environmental protection unit, including the following functions: login; logout; personal information management; test package report; report details view; base station information view.

III. Software Architecture Design

This mobile communication base station inspection report system adopts the front-end separation mode for development, the front-end using Freemarker framework template technology to generate ftl templates, and finally rendered into a H5 in the browser to build user pages. The front-end and back-end mainly use HTTP protocol to achieve interaction through asynchronous request technology Ajax, in order to facilitate the unified processing of the response results, the system uses JSON formatted data for transmission. The back-end is developed using the Java language and uses the SpringBoot framework, naturally adopts the MVC development mode to develop the system logic is divided into a page control layer, business logic layer and data access layer. The internal function of high cohesion between the call loosely coupled, so they are oriented to the interface development and call. The data storage is through the Mybatis framework MySQL database tables mapped to Java entities, to facilitate the back-end object-oriented development and call. Java and the database using JDBC technology to connect.

IV. The realization of this system function

1. Login, logout to achieve a unified entrance to the role of a unified interface, through the drop-down box to select different roles. The foreground after entering the account password select the role of the JS implementation of Ajax data submission, the backend controller receive the submission of data to call the corresponding UserService interface inside the login method, and then the database query, so as to verify that the user is legitimate! Login.

The core code for login is shown below.

```
@RequestMapping("/login")
@ResponseBody
public Map<String, Object> login(HttpSession session, @RequestBody Map<String, Object> loginInfo){
    ResponseBean responseBean = new ResponseBean();
    String userName = (String) loginInfo.get("username");
    String password = (String) loginInfo.get("password");
    String role = (String) loginInfo.get("role");
    Map<String, String> url = new HashMap<>();
    QueryWrapper<User> qw = new QueryWrapper<>();
    qw.eq("username", userName);
    qw.eq("password", password);
    qw.eq("role", role);
    User user = userService.getOne(qw);
    if (user == null) {
        responseBean.putError("User name/password error");
    }
    else {
        if (role.equals("1")) {
            url.put("url", "/admin/main.html");
            responseBean.putData("data", url);
            session.setAttribute(WebConstant.SESSION_KEY_ADMIN, user);
        }
        else if (role.equals("2")) {
            url.put("url", "/admin/role2/main.html");
            responseBean.putData("data", url);
            session.setAttribute(WebConstant.SESSION_KEY_ADMIN, user);
        }
        else if (role.equals("3")) {
```

```

url.put("url", "/admin/role3/main.html");
responseBean.putData("data", url);
session.setAttribute(WebConstant.SESSION_KEY_ADMIN, user);
session.setAttribute(WebConstant.SESSION_KEY_USER, user);
}
else {
url.put("url", "/staff/main.html");
responseBean.putData("data", url);
session.setAttribute(WebConstant.SESSION_KEY_USER, user);
}
}
return responseBean.getResponseMap();
}

```

2. Personal information function implementation is also unified for all roles logged into their respective background, you can see the menu about personal information management, click on the menu can be viewed and edited information.

The core code of personal information is shown below.

```

@ResponseBody
@RequestMapping("/editInfo")
public Map<String, Object> edit(@RequestBody User u, HttpSession session){
ResponseBean responseBean = new ResponseBean();
userService.updateById(u);
// updat session
session.removeAttribute(WebConstant.SESSION_KEY_ADMIN);
session.setAttribute(WebConstant.SESSION_KEY_ADMIN, userService.getById(u.getId()));
return responseBean.getResponseMap();
}

```

3. other functions of the code here will not be shown one by one, only to give individual function code as a representative, such as environmental protection unit report details, the core is as follows:

```

@Autowired
private IReportContentService service;
@RequestMapping("/list")
public Map<String, Object> list(Page<ReportContent> page, ReportContent entity){
QueryWrapper<ReportContent> qw = getQueryWrapper(entity);
IPage<ReportContent> pages = service.pageList(page, qw);
return new ResponseBean(pages).getResponseMap();
}
@RequestMapping("/listData")
@ResponseBody
public Map<String, Object> listData(){
return new ResponseBean(service.list()).getResponseMap();
}

```

IV. Summary

The research work of this program design has basically reached the expected requirements, through the user requirements analysis, functional design, database design, system implementation, system integration testing and several other design processes, and finally realized the mobile communication base station inspection report management system of all aspects of the use of the function, these functions are mainly the following:

1. The construction of the information management concept of inspection report is realized, and a set of solutions that can be implemented on the ground is provided to improve the efficiency of base station inspection report business processing.
2. Several processes such as problem definition, requirement collection, function design, system realization, and so on were carried out to complete the system realization.
3. The mobile communication base station inspection report management system realized in this project can satisfy the administrators to manage the basic data and the entrusted units to manage the base station information in the system. It can also satisfy the management of testing reports, report details and testing units by EIA staff. It can satisfy the environmental protection staff to accept the test report of the corresponding base station.

Reference

- [1]. Wang Xinling. Research on key technologies of green communication for 5G mobile networks [A] . 2015.
- [2]. Li Hanjun,Zhang Yijun,Pan Haijie. Research on optimization design technology of 5G mobile network for urban complex environment [J] . Communication Technology. 2019, no.003 Issue.
- [3]. Pan Xinyan. Discussion on 5G mobile network planning in smart city [J] .Communication World. 2021,Issue 006.
- [4]. Blanco, Begoña, Fajardo, Jose Oscar, Giannoulakis, Ioannis.Technology pillars in the architecture of future 5G mobile networks: NFV, MEC and SDN [O]. 2017.
- [5]. Geng Xiangyi, Zhang Yuping.Java object-oriented programming [M]. Beijing:Tsinghua University Press,2020.1.
- [6]. Li Gang. Crazy Java Handbook. 4th edition. Beijing: electronic industry press, 2018.
- [7]. Luo Ruwei, Java Web Development Technology and Project Practice [M]. Beijing: water conservancy and hydropower press, 2019.
- [8]. Wang YY.MySQL 8 from Beginner to Master [M]. Beijing: Tsinghua University Press, 2019.
- [9]. Wang Mei. Simulation based on Javaweb built-in object session[J]. Science and Technology Wind, 2019(10):74.