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Design and Implementation of Sports Social Information Management System based on Spring Boot

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Abstract: To improve the level of sports social management, to achieve standardized management, quick query, scientific statistics of sports social information, and to meet the needs of sports organizers, social platform managers, and other users, this paper introduces a sports social management system based on Spring Boot. The system uses Eclipse for Java Web development, selects MySQL 5.6 database as the background data storage solution, uses Java language to write code, and uses Tomcat server to build the running environment of applications. The system has the function of adding, deleting, changing and checking sports activities, supporting the input, query and statistical analysis of users' sports results, sports consumption and sports distance, and also allows to add, delete, modify and query the information of sports friends, aiming to provide users with a comprehensive and efficient sports social information management platform.

Keywords: Sports social information management system; MySQL; Vue3; Eclipse

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1. Introduction

With the growing emphasis on physical health, developing a sports social information management platform has become especially crucial. Such a platform can effectively combine sports resources with societal demands while offering sports enthusiasts a convenient space for communication and interaction. It not only facilitates the rapid dissemination of sports-related information and boosts participation in activities but also leverages data analysis to provide users with personalized sports recommendations, thereby enhancing their overall experience. Furthermore, it assists sports event organizers in efficiently managing activities and optimizing resource allocation, contributing to the healthy evolution of sports social culture. This paper explores the design of a lightweight sports social information management system based on Spring Boot [1], utilizing Eclipse as the development tool and MySQL as the database. The system is characterized by its simplicity, intuitiveness, and ease of operation. Thanks to Java's strong portability, the system can operate across various operating system platforms.

2. Related technologies

2.1. MySQL 5.6

As a classic open-source relational database, MySQL 5.6 has high stability and reliability. It can efficiently manage data, perform well in data storage and query processing, and is widely used in various Web and enterprise applications.

2.2. Maven 3.8.4

Maven 3.8.4 is a powerful project construction management tool. Through simple configuration, it automates dependency management and the project construction process, greatly improving the efficiency of Java project development [2].

2.3. Tomcat 9.0

Tomcat 9.0 is a commonly used open-source Web application server. It supports the latest Servlet and JSP specifications, can stably deploy Java Web applications [3], and provides an efficient operating environment for Web projects.

2.4. JDK 1.8

JDK (Java Development Kit) is the Java development kit, which provides the core libraries and tools required for compiling and running Java programs. It is the basic environment for Java developers to build various applications.

2.5. Eclipse

Eclipse is a well-known open-source integrated development environment (IDE). It has a rich plug-in ecosystem, supports multi-language development, and provides one-stop and convenient services for developers, such as code editing and debugging.

3. Functional analysis and designing of the system

3.1. The functional requirements of the system

The system is primarily designed for storing users' personal and sports-related information, enabling the management of individual fitness data. This encourages users to develop a passion for sports and exercise appropriately, ultimately facilitating the sharing of personal sports data and experiences. This contributes to the establishment of a sports information network [4].

3.1.1. Identity verification

Define the user within the system, distinguishing between two categories of users with different permission levels: regular users and administrators. Assign specific operational permissions based on these user categories. Both users and administrators must authenticate through username and password verification to access the system; unauthorized individuals are unable to log in [5].

3.1.2. Publishing an article

Post an essay to record your body's true reactions and deep feelings after each workout.

3.1.3. Personal focus

This module can implement the activities of adding, deleting accounts, and posting, and can also change the user's name and password.

3.1.4. Chat online

This module allows users to share their sports status with friends in real time and efficiently.

3.1.5. Posting events

Select a sport you are passionate about to promote, and share it online. This can draw individuals who enjoy the same sport to join in, fostering greater interaction and connection among people.

3.2. Module function design

According to the requirements analysis, the system's functionality is organized into several distinct modules, each responsible for specific tasks. This system's functionality is primarily categorized into five modules: article posting, event publishing, personal profile management, navigation routing, and instant messaging.

3.3. The main framework of the system

The system utilizes Spring Boot as the foundational framework for development. Spring Boot is an open-source framework created by the Pivotal team, designed to significantly streamline the creation and development of Spring applications. It offers several notable features: it enables rapid project setup by providing extensive default configurations and launchers, thereby drastically reducing the initial configuration time required for a project. It adheres to the principle of "convention over configuration," minimizing the configuration workload for developers and allowing them to concentrate on business logic. Additionally, it incorporates an automatic configuration feature that builds Spring components based on project dependencies and configurations, such as database connections and Web servers. It provides robust support for microservice architecture [6], making it easy to integrate with other microservice frameworks [7]. Spring applications can be packaged into standalone executable JAR or WAR files, eliminating the need for external containers. Furthermore, it includes functions for application monitoring and management, such as health checks and performance metric tracking, among others [8].

3.4. Database design

Database design is the process of planning and building a database. First of all, it is necessary to analyze the requirements to clarify the data storage and operation requirements. Then complete the conceptual design and build the model with an E-R diagram [9,10]. After logical and physical design [11], determine the data structure, storage methods, etc., to ensure efficient and stable data management. Through the analysis of system requirements, the data table designed for this system includes 11 data tables (**Tables 1** and **2**), such as s_activity, s_article, s_comment, s_friend, etc., taking the s_messages table and s_picture table as examples.

Table 1. S_messages table

Serial numbers	Field name	Data type	Remarks
1	messageID	int	Info
2	fromUserID	int	Sender
3	toUserID	int	Receiver
4	Content	varchar	Content
5	sentAt	datetime	Send time

Table 2. S_picture table

Serial numbers	Field name	Data type	Remarks
1	Picture_id	int	Picture id
2	Article_id	int	Associated articles
3	URL	varchar	Image URL

4. Implementation and testing of the system

4.1. Feasibility analysis

During the initial phase of the project, the primary objective of the system was established: To develop a platform capable of storing and managing users' details and sports-related data, thereby encouraging users' interest in sports and enabling the sharing of sports information. Subsequently, a feasibility analysis was conducted focusing on the technical dimensions [12]:

Technical analysis: evaluate the applicability and stability of MySQL 5.6, Maven 3.8.4, Tomcat 9.0, JDK 1.8, Eclipse, and other technologies to confirm that they can meet the needs of system development.

4.2. Requirements and architecture design

During the connection between requirements and architecture design, the business needs were thoroughly examined, and the overall structure was designed using the Spring Boot framework as the foundation.

Requirement Analysis: The system's functional requirements are outlined comprehensively, encompassing identity confirmation, article posting, personal dashboard, instant messaging, and event creation.

System Architecture: The system is structured into various functional components, and its overall framework is developed using the Spring Boot framework. This encompasses structures such as the database, business logic layer, presentation layer, and additional elements.

4.3. Detailed design and coding

During the detailed design and coding stage, the Spring Boot project was created using Spring Initializr, which also established the necessary infrastructure.

Project creation: The basic framework of the project was generated using Spring Initializr, and the related dependencies were configured.

Writing business logic: The business logic code is written in the service layer and realizes the core function of

the system [13]. The core function code is shown as follows:

<h2> Recommended route </h2><div class= “route-info” v-for= “route in routesList” :key= “route”>

<div class= “route-media” :style= “{border: ’5px solid’ + levelcolor[route.level]}”> This part is the core code of the recommended route, and different difficulty sports routes will use different color borders to show their data.

Design database: Design database table structure according to business requirements, and write the Mapper interface and mapper [14]. xml file to achieve data persistence.

Front-end development: Combined with Vue3, the front-end page was developed to realize the interaction and display of the user interface. The following figure is part of the core code [15]:

Ranging function enclosing distanceTool = new distanceTool (enclosing map, {linestroke: 2, our linewidth: 10,});

this.distanceTool.addEventListener (“removepolyline”, function(e){}),

this.distanceTool.addEventListener (“addpoint”, function(e){}); this.distanceTool.addEventListener(“drawend”, function(e){console.log(“drawend”);

for(var i=0; i<e.points.length; i++){that.$props.linePoints.push(

new BMap.Point(e.points[i].lng, e.points[i].lat)});.

5. Summary and outlook

The sports social information management system serves as a crucial platform for managing and sharing sports-related information, playing a significant role for users. This paper details the design and implementation process of the system, along with the fundamental applications of its various functions. Nevertheless, the system requires enhancement in its concurrent processing capacity to ensure stable operation during high-concurrency situations and prevent system deadlocks. In future upgrades, the system will more effectively cater to the requirements of sports enthusiasts.

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Disclosure statement

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