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Design and Implementation of Internet-oriented News Management System

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***Abstract*—The electronic news system is an information platform developed with the help of Internet technology based on the online information release needs of news propaganda organizations. Through the electronic news system, people can not only see the same information as regular paper newspapers, but also help realize the standardized management of news information, and bring convenience for readers and editors to inquire and read. In the daily work of ordinary new media, the personnel of various departments must categorize, typeset, store, and publish the massive news generated daily. The traditional management system wastes a lot of human resources when performing the above tasks. It may cause problems such as incorrect classification, cumbersome process, and data loss. Therefore, in order to solve the current problems of the news management system, this article analyzes the needs of the news management system. Then this article proposes an integrated news management platform consisting of six parts: news management, news preprocessing, news classification, news recommendation, user information management, and operation management. The test results show that the various performance indicators of the system have reached the requirements of the pre-demand analysis, which shows that the system designed in this paper is scientific and the function of the system is perfect.**

Keywords-news; Internet; architecture design; data processing;

I. INTRODUCTION

Modern information technology represented by the Internet has developed rapidly, and new types of network media have emerged and are widely used [1]. Compared with traditional media, the information carrying capacity of the Internet is more powerful, and it is replacing traditional paper media and television broadcast media at an unimaginable speed. The current real-time news release system is a networked and information-based news information display platform developed based on the Internet [2]. At present, users who read news on the Internet are far greater than users of paper media. With the development of information technology, this proportion will become higher and higher. Therefore, electronic news systems have become the future development trend. However, current news management systems have certain shortcomings, such as not being able to make news recommendations based on users' interests [3]. Therefore, how to use network technology to build an electronic news system with high user satisfaction is the focus of this article.

II. ANALYSIS OF RELATED TECHNOLOGIES

A. Docker container technology

Docker is an open source project developed based on the Go language. Its purpose is to implement a lightweight virtualized operating system. It is one of many containers [4][5]. With production and use, Docker has become synonymous with containers. It can perform unified management of the software life cycle, including packaging, deployment, migration, rollback, operation, termination, etc. All Docker containers share the use of the operating system's kernel and other system resources. Therefore, compared with traditional virtual machines, the lightweight Docker container occupies less space, is deployed quickly, is easy to migrate, starts fast, runs efficiently, and can be maintained and expanded more easily[6]. The automated deployment process of Docker is shown in Figure 1.

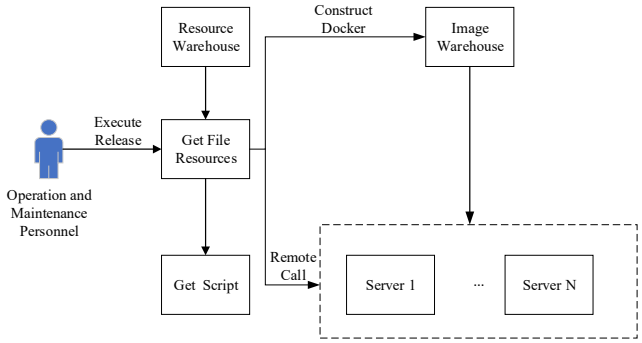

Figure 1. Docker automated deployment process

B. Push technology

Push technology is a technology that actively and timely sends messages from the server to the user. It does not require the user to make a request, but the server actively sends the information to the user [7]. This technology can let users know the information of handling official affairs for the first time, and make full use of the fragmented time to improve the capacity and efficiency of official affairs [8]. This article adopts the push mechanism Androidpn of extensible message and existence protocol XMPP.

Androidpn includes a complete server-side and client-side. The server adopts the open source server open, and uses it as the server implementation method of the push module of the mobile office platform [9]. The client uses the XMPPC

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connection provided in asmack to establish a continuous connection with the server, and through the connection for user registration, login authentication, etc., it also receives the information pushed by the server [10].

III. Analysis of the Functional Requirements of the News Management System

The system adopts a microservice architecture, and the system is divided into several small modules at the beginning of the design. Each module has its own functional characteristics and can meet specific business requirements. They call each other through RPC and complement each other, thus becoming a complete system. Next, we will introduce the demand analysis of several system modules.

A. News display module

This module is a module for the system to interact with users. It is developed by front-end personnel. It mainly includes news divided by tags and categories and current hot news. The news is stored in the database after preprocessing and text classification. The front-end is divided into categories for display. Hot news is stored in the Redis cache according to the number of clicks, to provide users with the latest and most popular first-hand news.

B. News management module

The users of this module are mainly operators and news writers. Operators can perform operations on existing news, such as querying, editing, and deleting. News writers can also upload news in the system, or modify or delete the uploaded news.

C. News preprocessing module

After the news writer uploads the news, the preprocessing module starts the first step of processing the news, which mainly includes word segmentation, stop word removal, sensitive word detection, keyword extraction, content formatting, etc. It provides good data support for the classification of news text.

D. News text classification module

According to the news in the training set and the optimized Bayesian formula, a classifier with news text classification capability is obtained. The pre-processed news enters the classifier to get the category and label of the news, and then saves it in the local database.

E. User information management module

This module supports basic user registration and login functions. The system administrator can add, delete, modify system user attributes and adjust user permissions in this module. Other users can also manage their own attributes in this module, including nicknames, passwords, and viewing permissions. This module provides convenience for personal information management and increases user experience.

F. News recommendation module

Ordinary users can customize the tags they are interested in, and they can also mine the potential interest tags of users based on their visits to construct a user's interest graph. Personalized news push to users based on tags and collaborative filtering recommendation algorithm.

G. Operation module management module

The main purpose of this module is to facilitate the management of system functions for operators, including hot news push, advertisement delivery management, site message management, data statistics management, comment feedback management, etc. Operators can use this module to query and monitor business data, adjust advertising configuration, send site messages to specific users, manage news reviews and other subdivision operations.

IV. News Management System Architecture Design

A. System overall structure design

When designing a software framework, the most common structure is a hierarchical structure. From the current point of view, the three-tier architecture design is the most popular method in the layered software framework design. According to this method, all systems can be subdivided into three levels: data access layer, business logic layer, and presentation layer based on application logic abstraction.

When designing and developing software, auxiliary classes such as transaction processing classes and database access classes are often used. Taking into account the reuse requirements of each module, in the design process of the system software framework, it needs to be separated as an independent module. For information system software, the views and data tables in the database are all the objects of system operation, and they want to achieve the purpose of mutual transmission among various layers. When designing the framework, the entities and methods of the data objects must be separated to form a common entity class module.

The basic platform of the news management system is composed of a three-layer structure, and different layers have different meanings. The first layer is the presentation layer, mainly generating interfaces, receiving information, and outputting results. The second layer is the application layer, mainly for operation logic and maintenance. The third layer is the storage layer, which mainly stores data. In this group of structures, the design of the upper layer is built on the basis of the lower layer, but the design of the lower layer is independent. The three-tier architecture diagram is shown in Figure 2.

B. System function design

As shown in the system function diagram in Figure 3, the administrator needs to perform the following operations. The first is to upload and download media materials. The second is to manage cataloging information. The third is to manage basic information. In addition, the system is also equipped with retrieval and system management functions. The retrieval function is mainly aimed at querying information and making statistics on reports. The system management function is mainly to help administrators manage user rights, modify passwords, and manage logs at the same time.

C. Database design

A large amount of data is involved from news acquisition, user registration, user browsing, to the final news recommendation. These data need to be stored in the system in a reasonable and orderly manner, so as to improve the speed of data query and modification, and then optimize the operation of the system effectiveness. The core of the software design of the news classification and management system is the database design. The database of the system is mainly used for data storage in MySQL. First, we first introduce some of the entities of the system and the connections between them. The entity connections are shown in Figure 4 below.

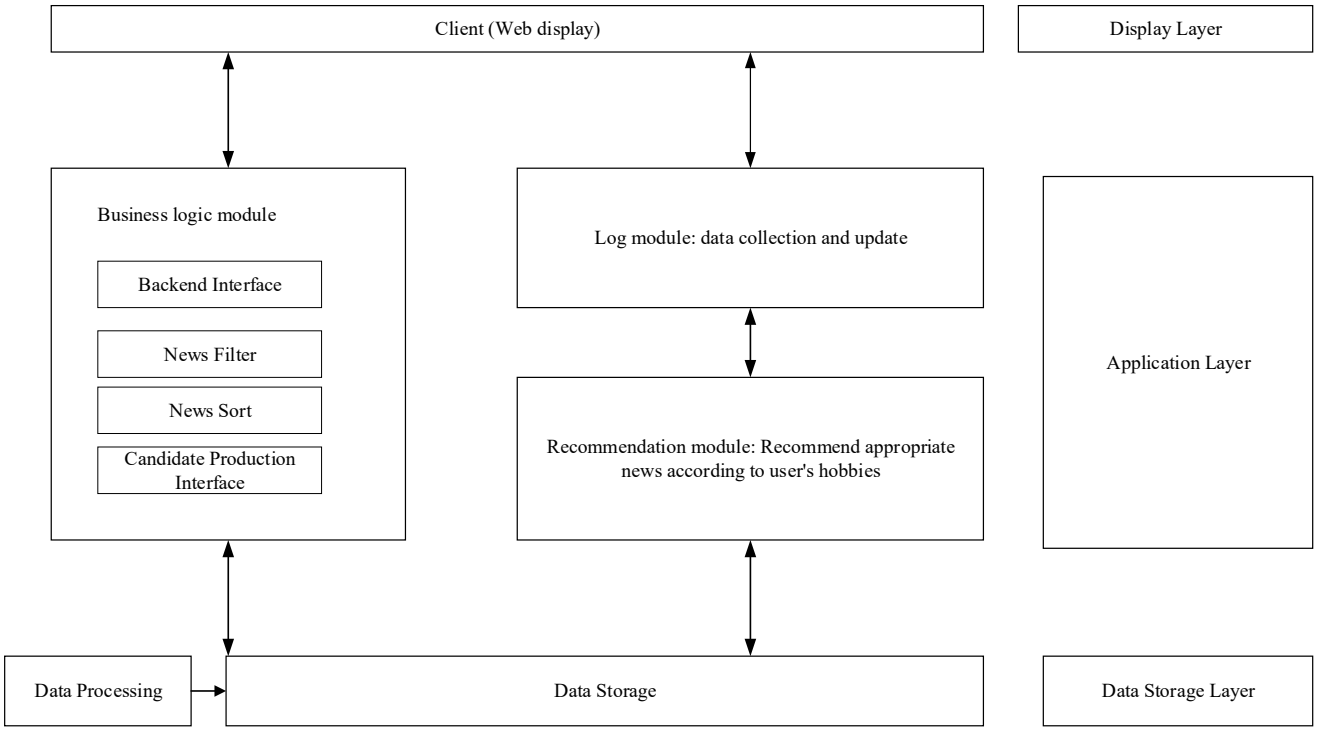

Figure 2. Three-tier architecture of news management system

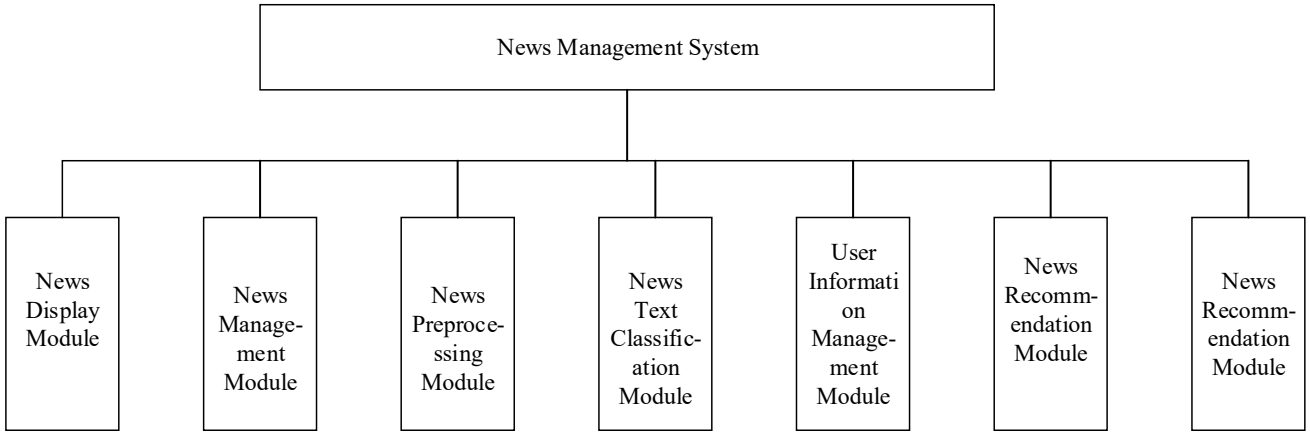

Figure 3. The functional architecture of the news management system

D. Function test

Software testing is an essential part of system development, including unit testing, integration testing, system testing, user acceptance testing, etc. Through systematic and comprehensive testing, problems can be found in time. And solve the problems in the system in time, which can improve the research and development efficiency and ensure the stable operation of the system. After the unit test, a functional test was performed to ensure that the system functions normally and runs stably. As shown in Table 1.

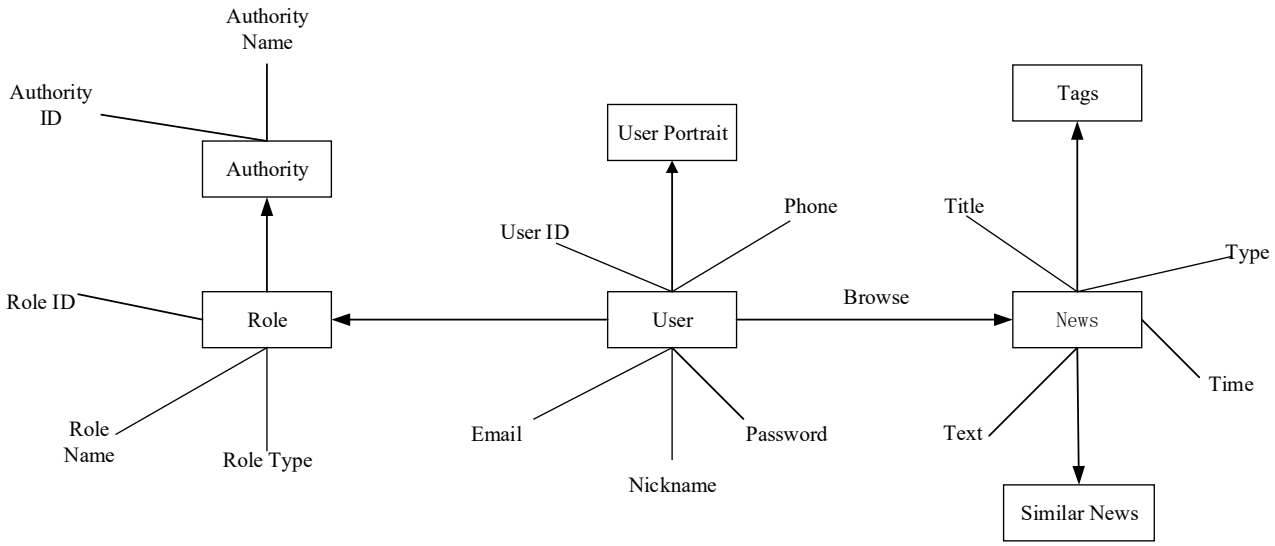

Figure 4. Entity connection diagram

TABLE 1 FUNCTIONAL TEST CASE SET

Test Case Name	Input	Output	Result
The pull tags are displayed normally, only the tags under the sports category are displayed	1. Click Add label. 2. Check the label display.	Only show tags under the sports category	OK
Only one label can be selected or not selected	1. Click to add a label 2. Add unique tags 0, 1, 2 3. Click Save	It can be saved successfully without adding or adding a label Failed to add multiple saves	OK
Unlimited number of multi-select tags	1. Click to add a label 2. Add multiple tags	Add multiple tags successfully added	OK
Delete Tags	1. Add multiple tags 2. Select one from multiple tags to delete 3. Saved successfully	The deleted label is successfully deleted from the drop-down box, and it is no longer displayed	OK

V. CONCLUSION

With the rapid development of Internet technology, human society is undergoing an unprecedented profound change. The continuous development of information technology has made it play a huge role in various fields and promoted the development of various fields. At present, the news management system has been applied to deal with the electronic news management business. After a period of trial, the trial results show that the system has good practicability and can be used to deal with the various businesses involved in the electronic news management system. This article implements the basic functions of news entry to recommendation to users, and has been optimized to a certain extent, but there is still a big gap between professional news portals, such as no global search engine, no historical access records, and relatively high system availability. I hope that in the future, we can further design and optimize the system from the perspective of users.

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