

- Set and adjust parking lot charging rules, such as adjusting charging standards for different time periods, setting free parking duration, etc.
- Receive system alarm information, such as abnormal parking space occupancy alarm, equipment failure alarm, etc., and handle them in a timely manner.

The intelligent parking lot management system mainly includes the following core classes:

Vehicle: records basic information about the vehicle, such as license plate number, vehicle type, etc.

Entry Record Class (EntryRecord): records vehicle entry time, license plate number, entry gate and other information.

Exit Record Class (ExitRecord): records vehicle exit time, license plate number, exit gate, parking fee and other information.

FeeRule: defines charging standards for different time periods and vehicle types.

System Administrator: manages various parameters and user permissions of the system. The system data is stored in the database, including vehicle information, parking space information, entry and exit records, charging rules, etc. The database uses a relational database, such as MySQL, to ensure data integrity and consistency. Vehicle entry and exit information is obtained through license plate recognition equipment, and parking space status information is collected through geomagnetic sensors or ultrasonic sensors installed on the parking space. These data are transmitted to the system server in real time for processing and storage.

The system will automatically identify the vehicle's license plate number through license plate recognition technology, and determine whether the vehicle has reserved a parking space or whether it is a monthly card user. For vehicles that have reserved parking spaces, the system automatically guides them to the reserved parking spaces; for vehicles that have not reserved parking spaces, the system allocates vacant parking spaces for them according to the real-time status of the parking spaces, and provides navigation guidance. When the vehicle leaves the parking lot, the system automatically calculates the parking fee based on the parking time and charging rules. The owner can choose to pay online or pay in cash at the toll terminal at the exit. During the system development process, the stability and security of the system were fully considered. Encrypt data transmission to prevent data leakage; regularly back up the system to deal with sudden failures and ensure that data is not lost. At the same time, the system has good scalability, which is convenient for subsequent function upgrades and optimizations.

By designing and developing an intelligent parking management system, we can effectively solve the problems existing in traditional parking management, improve the management efficiency and service quality of parking lots, and provide car owners with a more convenient parking experience. In the future, with the continuous development of technology, we can further introduce technologies such as artificial intelligence and the Internet of Things to realize intelligent and unmanned management of parking lots and enhance the overall competitiveness of parking lots.

#### Reference

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## DEVELOPMENT AND OPTIMIZATION OF THE CAMPUS MANAGEMENT SYSTEM

*Liu Ya, master's degree student,  
Dunina E., PhD in Physics and Mathematics, associate professor,  
Sokalava H., senior lecturer  
Vitebsk State Technological University, Vitebsk, Republic of Belarus*

Abstract. This project aims to design and implement an archive management system to simplify the management and access of archive information by users and improve the efficiency and security of archive management.

**Keywords:** archive management, information system, database design, use case diagram, ER diagram.

The development of the archive management system is to meet the growing demand for archive management. With the increase in the number of archives and the expansion of information, the traditional management method can no longer meet the requirements of modern management. Therefore, it is particularly important to develop an efficient and secure archive management system. This project aims to realize the informatization, digitization and networking of archive management through information technology means, and improve the efficiency and security of archive management.

The project first conducted a system requirements analysis, and then selected the corresponding software technology, and then carried out functional design, database design and page design. The model can meet various needs of archive management, including the classification, entry, review, borrowing, return and query of archives.

The use case diagram (Fig. 1) shows the main functional requirements and user interactions of the system. The figure shows the operations of borrowing, returning, destroying, querying, adding, editing and deleting archives. Users (such as archive staff, administrators, and examiners) can perform these operations through the system.

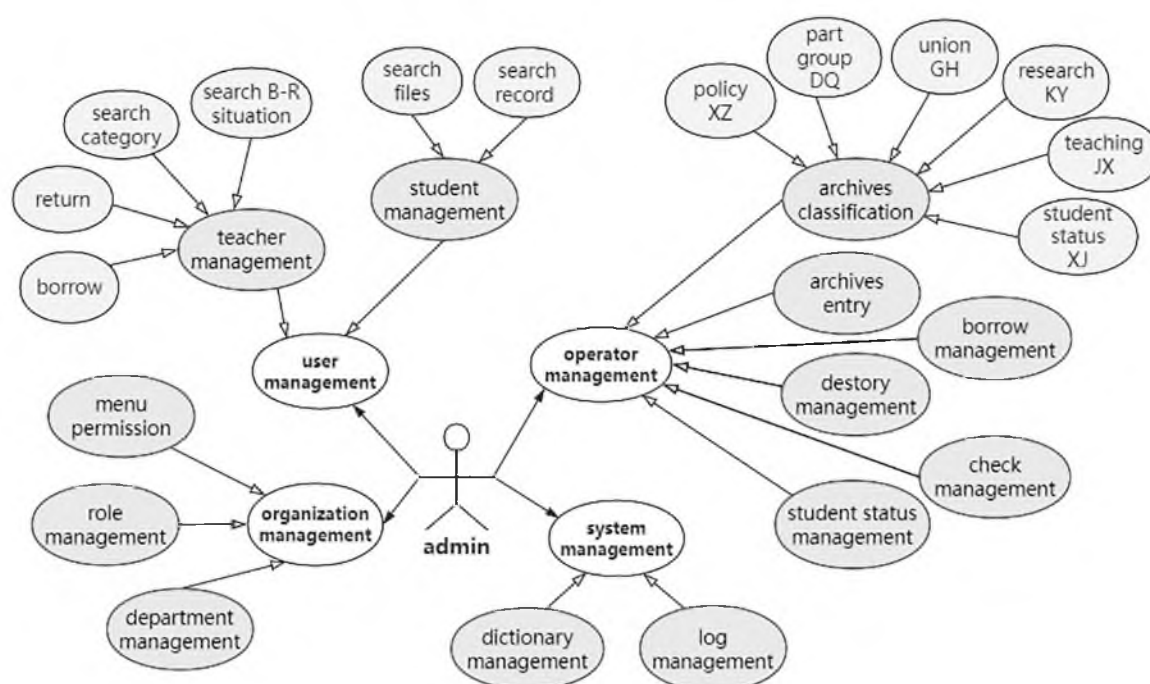


Figure 1 – System overall functional use case diagram

The system is developed in Java language and uses MySQL database for data storage. The main modules of the system include:

- user management module: realizes functions such as user login, authority management, and role management,
- archive management module: realizes functions such as classification, entry, review, borrowing, returning, and destruction of archives,
- student academic record management module: realizes the management function of student academic records,
- statistical report module: realizes the statistics and report generation of archive information.

The figure 2 shows the entity relationship diagram (ER diagram) of the archive management system, which shows the main entities and their relationships in the archive management system. A line represents the relationship between entities, and the label on the line represents the type of relationship (such as one-to-many, many-to-many). The functions of borrowing, returning, and

destroying archives are realized. These functions are operated through the interface provided by the system, and users can easily manage archives.

We designed a friendly user interface to facilitate users to query and manage archives. The system was fully tested, including functional testing and performance testing. The test results show that the system has good functions and performance and can meet the needs of archive management.

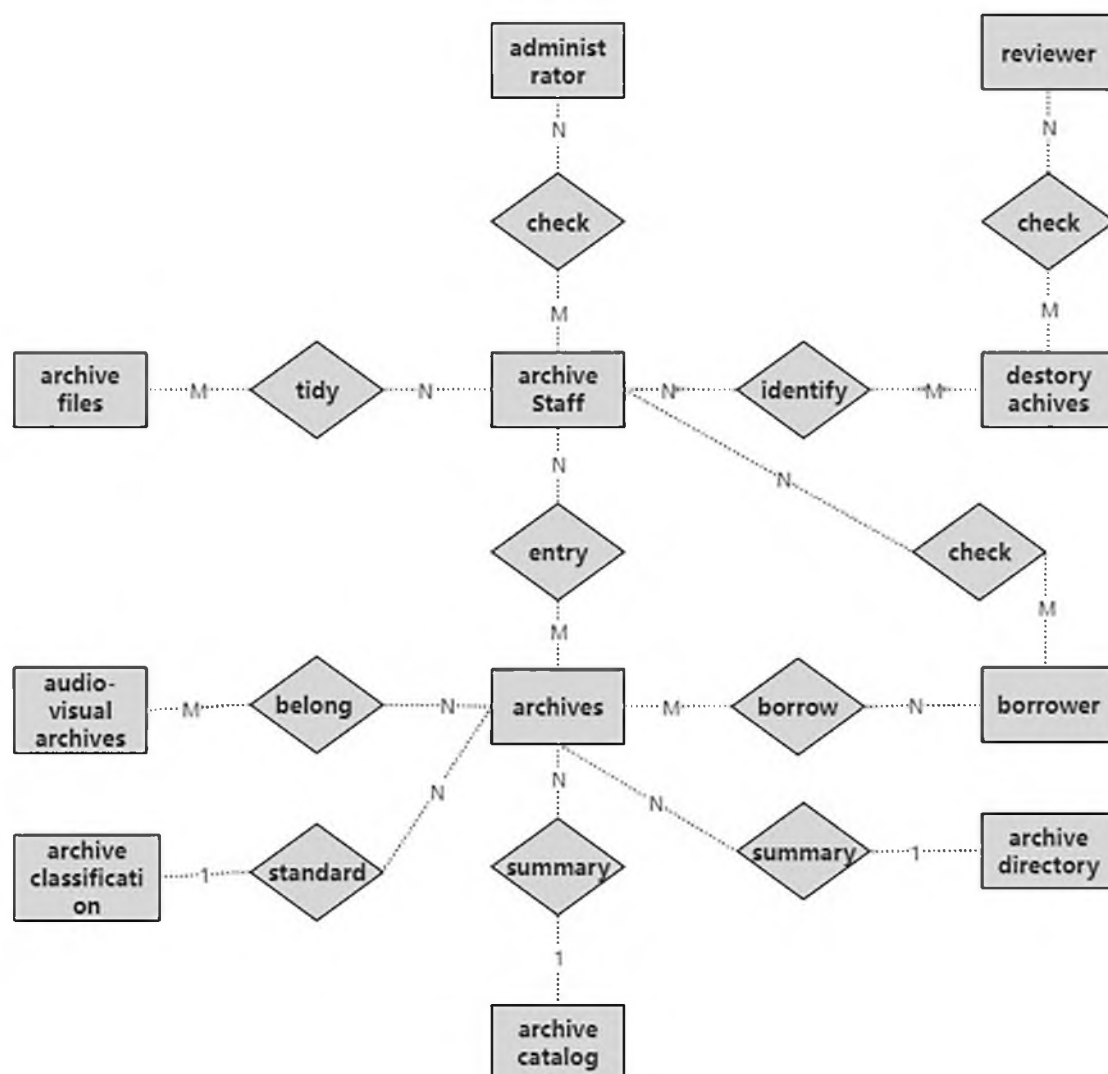


Figure 2 – Overall E-R diagram of archive management system

Through the work of this project, we have successfully developed an efficient archive management system. The system has good functions and performance and can meet the needs of archive management. The main work results of the system include:

- Database design: A database model containing multiple entities such as archive files, archive classification, and archive directory is designed to provide a solid data foundation for archive management.
- Function realization: The functions of borrowing, returning, and destroying archives are realized, which improves the efficiency and security of archive management.
- User interface design: A friendly user interface is designed to facilitate users to query and manage archives.
- System testing: The system is comprehensively tested to ensure the functions and performance of the system.

The work will further optimize the functions of the system and improve the security and reliability

of the system. Through the work of this project, we have not only improved the efficiency and security of archive management, but also provided strong technical support for the modernization of archive management.

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UDC 004

## DESIGN OF THE INFORMATION SYSTEM FOR DEVELOPMENT AND OPTIMIZATION OF THE PROJECT MANAGEMENT PLATFORM

*Wang Zihu, Master Degree Student,  
Zhyzneuski V., PhD in Physics and Mathematics, associate professor,  
Dzerkachenka P., senior lecturer  
Vitebsk State Technological University, Vitebsk, Republic of Belarus*

**Abstract.** *This article explores how to build an efficient, flexible and scalable workflow platform by combining microservice architecture with workflow technology to meet the office needs of modern enterprises in a multi-terminal environment.*

**Keywords:** microservice architecture; workflow technology; mobile office; enterprise informatization; process management.

In today's digital age, online office, learning, shopping and entertainment have become an important part of daily life. With the rapid development of Internet technology, enterprises and individuals are increasingly relying on various online platforms to improve work efficiency and quality of life.

The system for Development and optimization of the project management platform uses the uni-app framework for mobile terminal development, and the back-end service adopts the Spring Boot microservice architecture to communicate with the front-end through the RESTful API. The system design covers the basic management processes within the enterprise, including procurement management, contract management, personnel management, financial management, project management and general functional modules, aiming to improve enterprise work efficiency, promote team collaboration and communication, and ensure the security and confidentiality of data.

The system mainly realizes the following functions:

1. By automating the approval process, the approval cycle can be shortened and the work efficiency of the enterprise can be improved.
2. The content, process, conditions and other information of the approval process shall be fully disclosed to make the entire approval process transparent.
3. Reduce information monopoly and achieve seamless connection between cross-departmental approval and internal approval business of each department.
4. Promote team collaboration and communication, enabling team members to share information and work together in real time, thereby improving team collaboration efficiency and accuracy.
5. Standardize the approval process, archive approval logs and records, and ensure the security of approval data during transmission and storage

In this project, the basic management processes within the enterprise are defined, including procurement management, contract management, personnel management, financial management, project management and general functional modules. Each module shows the interaction between ordinary employees, department managers, directors and CEOs, as well as their roles and responsibilities in different business processes.

The data model of the microservice-based mobile workflow platform mainly includes process grouping, process definition, process instance, process task, and approval task (Fig. 1). The following is the database structure of the workflow engine, which is used to store and manage the various relationships of the business process.