

Design and Implementation of International Civil Aviation Security Information Database Management System

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Abstract. The issue of international civil aviation security information management is not perfect, and it is difficult to systematically maintain international civil aviation security information data, and cannot track the latest international civil aviation security information in a timely manner. This has led researchers and international security managers to fail to accurately grasp the international civil aviation security situation. Based on the framework of the international civil aviation security information management system based on the Web platform, the security management background function of the international civil aviation security information database management system, the international civil aviation security information portal function, the international civil aviation security information storage function, and maintenance function modules were designed and developed. At the same time, the research and implementation of the main functions in the SQL Server database platform and C# language support. The system can realize the functions of international civil aviation security information resource sharing, data query statistics, and web page automatic crawling. It helps researchers and international civil aviation security managers to track international civil aviation security information in time, so as to grasp and analyze international civil aviation security situation in time. Provide data support.

1. Introduction (Heading 1)

In recent years, a series of terrorist attacks involving the safety of civil aviation, such as the bombing of Russian air planes and terrorist attacks at the Brussels Airport, have occurred one after another, and civil aviation counter-terrorism has become severe again. At present, the development of terrorism has shown an international trend. Its scope of influence has gradually expanded from some countries and regions to all participants in international affairs, and has clearly pointed to sensitive civil aviation. For international civil aviation security, timely and accurate mastering of international civil aviation security information is the key to its survival and development, and the quality of international civil aviation security information management is an important part of improving international civil aviation security. Mastering international civil aviation security information is beneficial to civil aviation safety management personnel in all countries to discover potential safety hazards in a timely manner and correct them; at the same time, it provides data support for international civil aviation security exchanges. Therefore, an international civil aviation security information database



management system needs to be established to provide a platform for managing international civil aviation security information.

The construction of international civil aviation security information is the main content of the “13th Five-year Plan for Civil Aviation of China” issued by the Civil Aviation Administration of China in February 2017. The plan states that “the construction of a safe civil aviation system in an all-round way will deepen the development of the security system. The establishment of civil aviation and local sharing, law enforcement coordination of the working mechanism to improve civil aviation security protection and anti-terrorism prevention capabilities.” To closely track the deepening of international cooperation and the world’s most cutting-edge civil aviation security information, sort out statistics on types and characteristics of various types of civil aviation security information, and give full play to the role of sensitive indexes of civil aviation security information, which is an inevitable need to comply with changes in the anti-terrorism situation of international civil aviation, which is beneficial to International security information sharing and safeguarding national security.

With the rapid development of science and technology, computer hardware and software technology is also very mature. At the same time, the surge in international civil aviation security information also compels the need to establish an international civil aviation security information database management system. In this paper, the design and implementation technology of the international civil aviation security information database management system is studied

2. System software and hardware platform

The international civil aviation security information manager establishes a star topology in the form of a local area network. External users access the system via Web server. System software and hardware platforms are as follows.

2.1. Software

The system development environment can be built under Visual Studio 2010. The specific development environment is shown in Table 1.

Table 1. System Development Environment

Name	Specific information
Server	Windows Server 8; SQL Server2008+C
Client	win 8 desktop operating system

2.2. Hardware

Configure several computers, one of which is selected as a Web server, and the other computer is connected to a Web server through a switch to form a system administrator LAN. The specific configuration of running hardware is shown in Table 2.

Table 2. System Operation Hardware

Hardware name	configuration
Host	Core Duo i5 2.7GHz
Memory	DDR 3 8G
Hard dis	1T
Monitor	above VGA

3. Database System Organization Structure

The international civil aviation security database system consists of data storage, international civil aviation security information management background and international civil aviation security information portal. Data storage is mainly responsible for the storage of security data, security information and system configuration data. The international civil aviation security information management background is mainly responsible for the maintenance of basic system information, editing model of security data, editing process, data code, data record management, and push information. The integrated fetching and message push configuration is mainly provided for system administrators. The international civil aviation security information portal is used by leaders and teachers to provide functions such as data monitoring, data maintenance, statistics, data query, and information subscription. Includes PC version and mobile version.

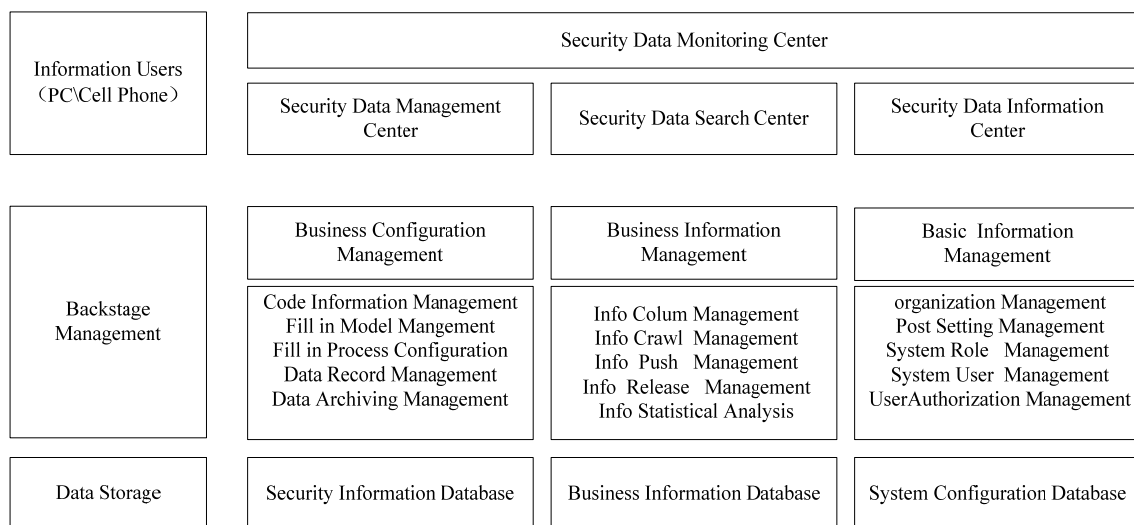


Fig 1. Structure of International Civil Aviation Security Information Management Platform

4. Database and System Design

In order to systematically manage international civil aviation security data information, an International Civil Aviation Security Information Database (ICASIDB) database needs to be established. In practice, the data is imported into the database. Save it to the server to facilitate maintenance updates. Administrators are generally required to continuously update the data in the International Civil Aviation Security Information Table and User Table of the ICASC DDE [2-5]. The international civil aviation security information table is used to store specific information on civil aviation security incidents occurring worldwide. Its structure should include common and necessary information for international civil aviation security events. The logical structure of the data is shown in Table 3, and the user data table is used to store the data structure of the managers and researchers of international civil aviation security information management and research is shown in Table 4. Once users log in to the system, they can directly search for relevant security information, and at the same time, they can aggregate statistics according to their needs and form reports.

Table 3. Data Structure of International Civil Aviation Security Information

Field Name	Data Type	Field Width	Nulls
Event ID	Char	10	No
Event Category	Char	1	No
Fine class encoding	Int	2	No
Fine class name	Char	30	No
Ordercode	Int	4	No
Occurrence	DateTime	8	No
Continent	Char	6	No
National	Char	6	No
Where it happened	Char	6	No
Event passed	Char	250	No
Number of perpetrators	Int	3	No
No. 1 sex	Char	2	Yes
No. 2 sex	Char	2	Yes
Age 1	Int	2	Yes
Age 2	Int	2	
Tools/Weapons/Dangerous Goods	Char	10	No
Event Effect Leve	Char	10	No
Departure location	Char	10	Yes
Landing location	Char	10	Yes
The actual landing location	Char	10	Yes
Terrorist Attack	Char	2	No
International flight	Char	2	No

Table 4. User Table Data Structure

Field Name	Data Type	Field Width	Nulls
User ID	Int	10	No
Username	Char	20	No
Name	Char	20	No
Origin	Varchar	20	Yes
Gender	Varchar2	30	Yes
Workplace	Varchar2	180	No
Title	Char	15	Yes
Education	Varchar2	20	Yes
Contact	Varchar2	30	No
Mailing address	Varchar2	300	No
E-mail	Varchar2	50	No
Biography	Varchar2	500	Yes
Professional	Varchar2	200	No
Research Direction	Varchar2	200	No
Remarks	Varchar2	600	Yes

5. Database System Functions

Considering the actual application requirements, usually the international civil aviation security information database system should include basic functions such as data management and maintenance, data information query and statistics [6-9]. To this end, the designed international civil aviation security information database management system has three major functions: First, the international civil aviation security information data storage function; Second, the international civil

aviation security management background function; Third, the international civil aviation security information portal function. The following mainly introduces the two major functions of the international civil aviation security management background and the international civil aviation security information portal.

5.1. International Civil Aviation Security Management Backstage

The system configuration provides the system administrator with an online configuration environment, including service configuration management, consultation message management, and basic information management. The specific functions are as follows:

1) System Management Login

Provides administrators with a background management login interface to ensure the security of system management.

2) Service Configuration Management

Business configuration management provides security data addition and editing model configuration functions, and configures the process and permissions for adding and editing security data, safeguards the readiness, compliance, and security of incoming data, and manages the addition of security data. The fixed code of the model, as well as the management of stored security data, viewing and archiving. Business configuration management mainly includes five functions: code information management, report model management, report configuration process, data record management, and data archive management.

3) Information Message Management

Configurable civil aviation security related websites and columns can be used to automatically and accurately capture relevant information messages through the system and automatically push them to designated users. They can be accessed through PCs and mobile phones, enabling information managers to keep abreast of international and domestic civil aviation security information. Related websites such as Aviation Safety Net, China Civil Aviation Safety Information Network, China Civil Aviation Administration Net, etc. Information message management mainly includes information column management, crawling, pushing, publishing, statistical analysis and other functions.

4) Basic Information Management

Basic information management mainly includes organizational management functions, organizational post management functions, system user management functions, system role management functions, and system rights management functions [2]. Specific functions are shown in Table 5.

Table 5. Specific functions of basic information management

Basic information management functions	Specific functions
Organization management functions	Provide organization's addition, edit, delete, view, etc.
Organize job management function	Provide job information, add, edit, delete, view, etc.
System user management function	Provide system users to add, edit, delete, view, etc
System Role Management Function	Provides the addition, editing, deletion, and viewing of role information, and binds system user information to implement the mapping between roles and users
System rights management function	Based on the role of detailed authorization system features, making users login in the system menu can only see the applications they have permission to visit.

5.2. International Civil Aviation Security Information Portal

Based on the unified service integration framework, the security information portal provides security information managers with a unified portal for information resources and one-stop access to data monitoring, data management, statistical analysis, and information subscription to achieve effective management of security information assets. The functions of the International Civil Aviation Security Information Portal package include a "landing" and four "centers." One portal is the portal application login. The four centers are Security Data Monitoring Center, Security Data Management Center, Security Data Query Center, and Security Information Information Center.

1) Portal Application Login

The portal application login provides a portal login interface for security information managers to secure the portal information.

2) Security Data Monitoring Center

The Security Data Surveillance Center is a visual presentation portal for international security data. Based on the security data entered and imported, international security data is monitored centrally through excellent graphical presentations, including PC and mobile versions, including more than 20 data. Analyze the visual interface (see Table 6).

3) Security Data Management Center

Security Data Management Center mainly includes security information entry, security information editing, security information deletion, security information import, security information export, security data query center, security information information center. (For specific functions, see Table 7)

4) Security Data Query Center

Providing autonomous setting of complex query conditions, according to their own required fields and conditions, can directly filter out the required information from the database system, and support data export. (See Figure 2 for the query center interface)

5) Security Information Center

The sub-items uniformly present crawling information. (Information Center interface is shown in Figure 3)

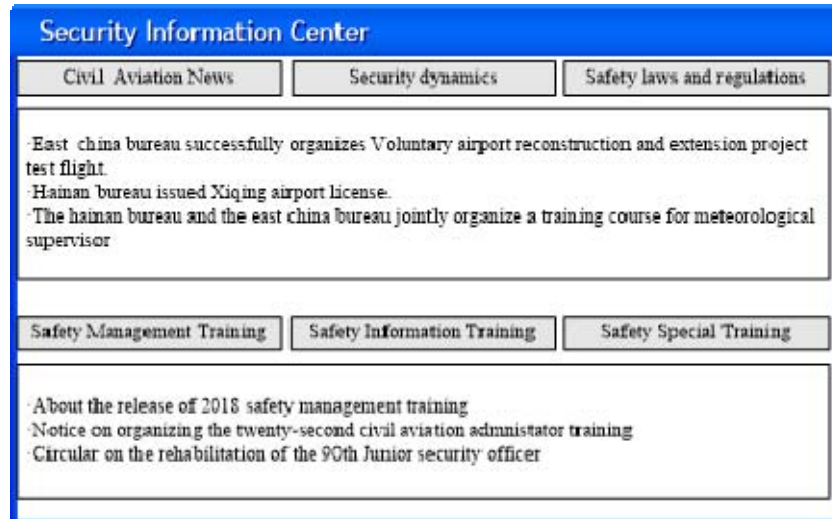
Table 6. Visual Data Table

function name	Specific function
World Civil Aviation Security Incident Analysis	Including complex condition filtering, security event data drilling, etc.
China Civil Aviation Security Incident Analysis	Including complex condition filtering, security event data drilling, etc.
His Civil Aviation Security Incident Analysis	Including complex condition filtering, security event data drilling, etc., can be expanded according to countries or regions.
Analysis of major incident security data	Showcase the analysis of major types of security data through trends, pie charts, bubble charts, etc.
Event Details Security Data Analysis	Showcase the analysis of major types of security data through trends, pie charts, bubble charts, etc.
Occurrence location security data analysis	Showcase the analysis of major types of security data through trends, pie charts, bubble charts, etc.
Staff gender security data analysis	Showcase the analysis of major types of security data through trends, pie charts, bubble charts, etc.
Tool Classification Security Data Analysis	Showcase the analysis of major types of security data through trends, pie charts, bubble charts, etc.
Impact Registered Security Data Analysis	Showcase the analysis of major types of security data through trends, pie charts, bubble charts, etc.
Religious background security data analysis	Showcase the analysis of major types of security data through trends, pie charts, bubble charts, etc.
Terrorist Attack Security Data Analysis	Showcase the analysis of major types of security data through trends, pie charts, bubble charts, etc.
Analysis of Psychiatry Security Data of Practitioners	Showcase the analysis of major types of security data through trends, pie charts, bubble charts, etc.
"One Belt and One Road" Analysis of Security Data	Showcase the analysis of major types of security data through trends, pie charts, bubble charts, etc.

Table 7. Security Data Management Center Features

function name	Specific function
Security information entry	Through this database system, international civil aviation security information data can be entered into the database and saved.
Security Information Editor	The database system can correct the error information in the database and save the modified data in the background database.
Security information deleted	With this database system, redundant security information in the database can be deleted, and the deletion result can be saved.
Security information import	Provide tools for bulk import of security information into the database.
Security information export	Provide tools to enable security information to be exported in bulk from the database.

ID	Event category	Fine class coding	occurrence time	continent	country	scene	Event passing
D01001160101	D	03 Fighting, quarrelling, quarrelling	2016-01-01	Europe	Ireland	aerobat	A 42-year-old drunk lady.....

Fig 2. Query Center Interface**Fig 3.** Information Center Interface

6. System Implementation

6.1. The realization of each module

1) System login

The user system login module is the first step in the system implementation. After the user logs in to the system, the user name and login password need to be entered to match the account table in the database. There are only 5 chances for user account and password errors. Once you make a mistake, it will automatically close. The information entered by the system administrator is transmitted to the back-end database, and the validity of the user is determined by comparing the correct information

records in the database. If the user logs in for the first time, a password modification operation can be performed [11]. The user login interface is shown in Figure 4.

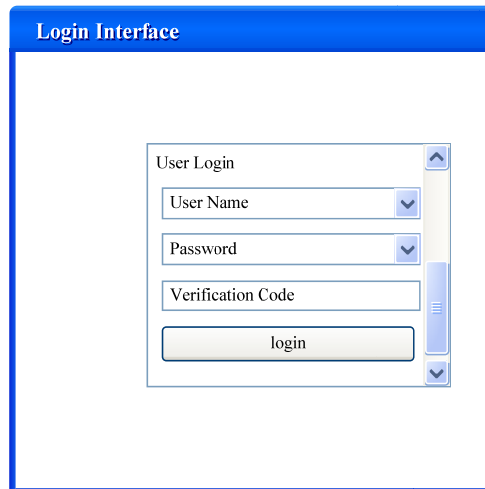


Fig 4. User login interface

2) Data Query Module

When the system is implemented, the query is divided into strict queries and non-strict queries, which are mainly implemented in a structured database query language. Among them, strict query requires exactly equal matching between each condition and record [10]. Strict queries use precise conditions in the dynamic implementation of T-SQL statements, such as "=0", while non-strict queries require only partial matches between conditions and records, such as "like" in T-SQL, query statistics. The specific process is shown in Figure 5.

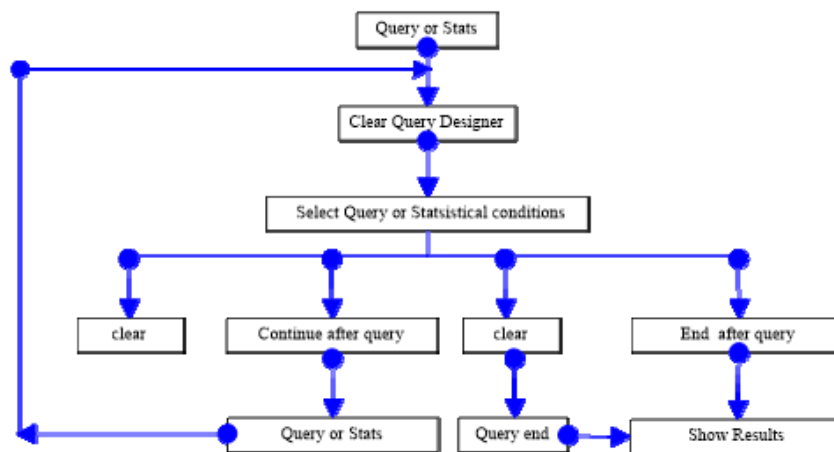


Fig 5. Query statistical data flow

6.2. System Maintenance

In order to ensure the normal operation of the international civil aviation security database management system, the database of the maintenance system must be updated in the daily use process to improve the reliability of the system operation. The database in the system needs administrators to maintain, because with the passage of time, the security information keeps increasing, if not follow up in time, it will lead to the system analysis result is not accurate. The specific flow chart for

maintaining security data is shown in Figure 6. The operation flow of data maintenance is to select the corresponding form for security information entry addition, modification, deletion, etc. when the administrator login is successful. In the specific operation, the legality judgment shall be performed according to the design requirements of the data table. The requested data is refreshed and saved to the database.

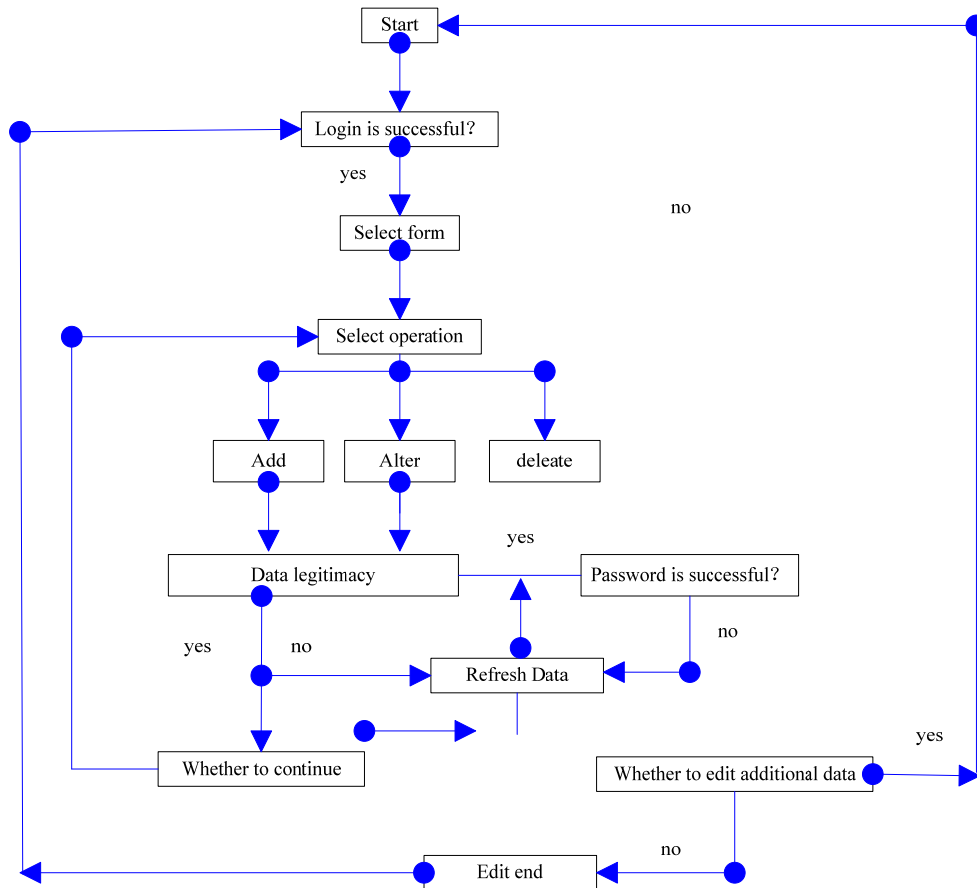


Fig 6. Data maintenance operation flow

7. Conclusion

This paper designs the logical structure of the international civil aviation security information database management system, and completes the construction of the database management system and the implementation of major functional modules under the SQL Servers database platform and C# language support [11]. Its main conclusions are as follows.

First, the international civil aviation security information database management system includes the international civil aviation security information data table and system user table. Its functions include major functions such as management functions, query functions, statistics functions, and maintenance functions.

The second is that the system's login module implementation is mainly based on the comparison of user databases. The system's query module is designed with strict and non-strict query. It is mainly based on structured query language. The maintenance function of the system is to operate the database under login conditions. Operation, using a structured query language, to determine the validity of the database and data tracking.

Third, the international civil aviation security information database management system helps to take advantage of network resources. It can realize resource sharing and web page information capture functions and quickly and accurately capture civil aviation security information at specific addresses.

Fourth, the international civil aviation security information database management system has two versions of computers and mobile phones, which can realize the security monitoring at any time.

The establishment of an international civil aviation security information database management system is an inevitable trend in the future research on the development of the international civil aviation security situation, and will help the timely follow-up of international civil aviation security information. Under the increasingly mature big data technology background, the international civil aviation security information database management system will play a greater role in providing data support for international civil aviation security management personnel.

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