Civil Aviation Authority
Isalmic Republic of Afghanisan

CrM

Crew Management System

Presented by ACAES Team

Technical Document | ACAA

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REVISION HISTORY

Name	Date	Revision Description	Version
Mirwais Farahi	**July 11, 2021**		**Version 0**

DOCUMENT APPROVAL

Signature	Printed Name	Title	Date

ACRONYMS AND ABBREVIATIONS

The following table describes the abbreviation and acronymous used throughout this Software Requirements Specification.

Abbreviation	Meaning
USAID	U.S. Agency for International Development
ACAA	Afghanistan Civil Aviation Authority
ACAE	Afghanistan Civil Aviation Enterprise Solution
CrM	Crew Management System
HKIA	Hamid Karzai International Airport
SRS	Software Requirements Specification
DSS	Data Storage System
HTTPS	Hypertext Transfer Protocol Secure
FTP	File Transfer Protocol
SSL	Secure Sockets Layer
AODB	Airport Operational Database

1 INTRODUCTION

1.1 PURPOSE

The purpose of this document is to describe the Software Requirements Specifications (SRS) for the Crew Management System (CrM) within the context of Afghanistan Civil Aviation Enterprise Solution (ACAES) for Afghanistan Civil Aviation Authority (ACAA) supported by USAID. The information of this SRS document is collected from Airport Operation Unit. The main purpose of this document is to work as a guideline to develop and implement CrM that fulfills the organization requirements. Furthermore, it will illustrate system constraints, interface, and interactions with other external applications. The document is also intended to be proposed to the business owners and involved departments of ACAA for their approval and is a reference for developing the first version of the system for the development team.

1.2 DOCUMENT CONVENTIONS

The SRS document uses few different font sizes for clear distinction. In addition, main headings are numbered with whole numbers like 1. Introduction, 2. Overall Description. The subheadings are numbered with decimals like 1.1 Purpose, 1.2 Document Conventions.

1.3 INTENDED AUDIENCE AND READING SUGGESTIONS

The document is intended to be read by ACAA directors, head of ACAA departments, managers of ACAA departments, project managers, developers, testers, users, and documentation writers. The document is organized into 5 parts as 1. Introduction, 2. Overall Description, 3. External Interface Requirements, 4. System Features, 5. Other Nonfunctional Requirements, and 6. Other Requirements. All the parts are independent but reading the whole file in a sequential manner helps the reader to understand well the Crew Management System.

1.4 PRODUCT SCOPE

The General Declaration is a file that contains crew relate information, such as flight number and date, departure/arrival airport, list of crews for that flight and their passport details. Crew Management is not practiced at HKIA and airlines are not sharing their General Declaration file with the airport. Therefore, there is no verification for the validity of crew licenses. A valid license of a crew shows that he/she has conducted all the updated required trainings and fits to fly. Hence, it is necessary to ensure the validity of crew licenses for a safe flight.

To address all above problems, there should be a Crew Management (CrM) System to ensure the validity of crew licenses for a safe flight. The data of General Declaration file should be shared through an integration with the CrM System. The airline is assigning and managing the crew for a particular flight. Therefore, the integration will push the required data to the ACAA's CrM system.

CrM is a module of Enterprise Software Solution for ACAA. It is web-based application for crew management at HKIA airport of Afghanistan. Its main purpose will be to automate the movement of data from airline to the ACAA's AODB and brings transparency, accuracy, and efficiency, reduce errors and timely update the flight crew for a particular flight. There will be an interface link with the database of licensing and certificates. It will help to know if the crew is fit and authenticated to attend that flight. In addition, The system generate reports for crew details for any flight in the past, report to know when that assigned crew had last shift and the for the validity of licenses of crew.

The functionality and Scope of the system is as follows: -

i. To validate the licenses of crew for a particular flight.
ii. Integration with the airline system.
iii. Email Notification to share the status of crew to the airline.
iv. To generate reports.

2 OVERALL DESCRIPTION

This section provides an overall description of the whole system. The basic functionality of the system and interaction with other systems will be explained. Furthermore, describes various types of users that will use the system and available functionality for each type of user. Finally, the constraints and assumptions for the system will be presented.

2.1 PRODUCT PERSPECTIVE

The main purpose of Crew Management System is to verify the validity of licenses of crew in a particular flight before departure. In case, a license of a crew is expired then the airline will be notified to update the crew license and he/she will not be allowed as a crew in a flight. The integration between the airline and ACAES System will make it possible to automatically receive the General Declaration file data which is the details of crew for a particular departure flight.

This system will consist of two parts: one client web portal and one management web portal. The client web portal will be used to receive the crew verification for a particular flight. The details for crew approval or rejection will be provided in the client portal for the airline and the airline will be also notified through an email. On the other hand, the management web portal will be used to verify the licenses of crews for a specific flight.

The Crew Management System will be a module of ACAE solution for ACAA. Figure 1 shows the major components of the overall system, and other system interactions to the system.

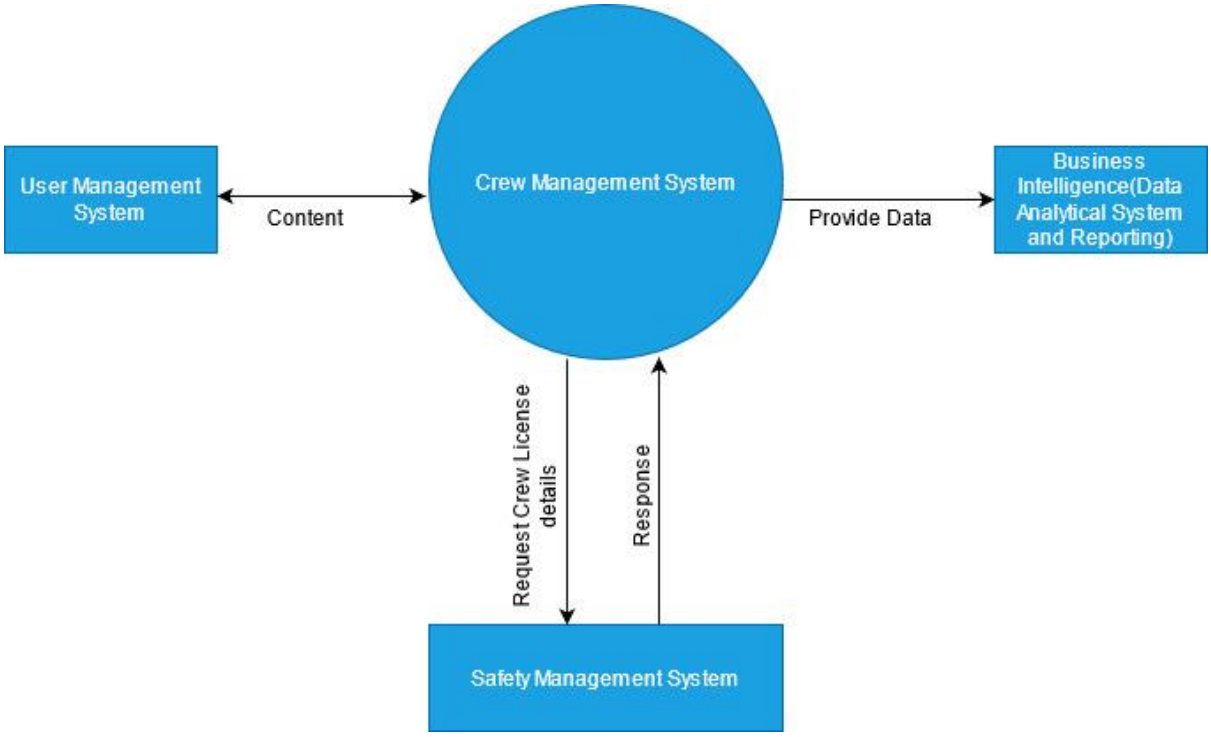

Figure 1: CrM Context Diagram

The system is using a central Airport Operational Database (AODB) to store the data. Both the client and management web portals will communicate with the database. The client web portal will use the database to send/receive flight crew data, while management web portal will validate the crew data and generate reports. All the database communication will go over the Internet.

The following list shows the main functionalities of system: -

- To automatically receive the crew data for a particular flight from the airline through system integration
- Crew data validation.
- Integration with Safety Management System.
- Email notifications for crew status to the airline
- To generate reports.
- Restrict and allow user control based on standards and policy of ACAA.

2.2 PRODUCT FUNCTIONS

CrM is a standalone system that provides functionality described in the Product functions section. It includes automatically validating crew licenses for a specific departure flight, and report generation to fulfill software requirements. In addition, CrM has interfaces to the external system, such as Safety Management System, and Business Intelligence System.

Any detailed definition of other external system is out of the scope of this document. Figure 2 shows the decomposition of CrM on the functionality area and supported external systems.

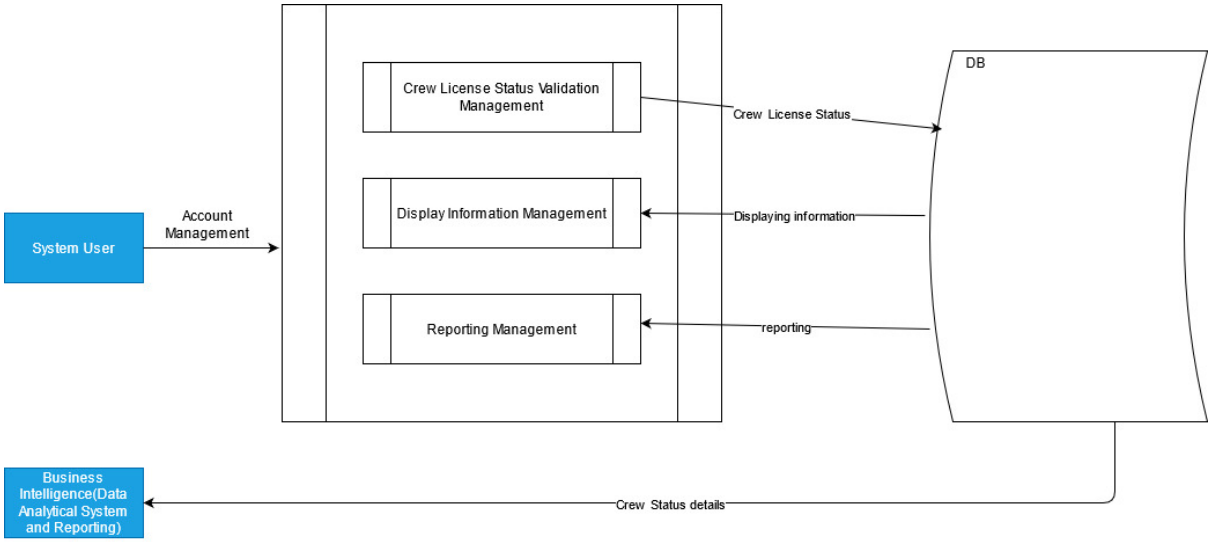

Figure 2: CrM Data Flow Diagram

It is required to have a Data Storage System (DSS) for CrM and all other external systems. CrM stores all the information and data in the DSS and the connection between CrM and DSS shall be made through standard interface (ADO .NET and Entity Framework).

2.3 USER CLASSES AND CHARACTERISTICS

There are three types of users to access and use the system. The users are defined as follows: -

i. **Airlines**: This type of user can only use the system to view crew verification status by the airport for a particular flight.
ii. **ACAA Staff**: The employees account will be used to generate reports for a flight crew.
iii. **Administrators**: They are managing the overall system so there is no incorrect information within it. The level of access for administrators shall be defined as system super admins and

admins. The super admins are responsible for managing all database users, taking backup, restoring recovery, maintaining the system and there is no system access level restrictions for them. The admins are responsible to create other system users and validate the data of system based on their access level.

2.4 OPERATING ENVIRONMENT

The following hardware and software components are required for CrM: -

i. Hardware Components

a. Server Side

- Linux Based Server: Two Linux Centos Servers
  1) First Servers: for running the ERP
     - Operating System: Linux Centos
     - Model: DELL EMC R940xa
     - Ram at least: 8GB*8 = 64GB or 8GB*16= 128GB
     - Ram Type: DDR3
     - Processors: Core i7(at least 7th generation)
     - Internet Bandwidth: 10Mbps
     - SSL Certificates
     - Yearly Operating System License fee: NO
     - SQL server License: YES (have to calculate)
     - Storage: 10 TB

  2) Second Server: for taking backup or use a secondary point to keep the system up and running.
     - Operating System: Linux Centos
     - Model: DELL EMC R940xa
     - Ram at least: 8GB*8 = 64GB or 8GB*16= 128GB
     - Ram Type: DDR3
     - Processors: Core i7(at least 7th generation)
     - Internet Bandwidth: 10Mbps
     - SSL Certificates
     - Yearly Operating System License fee: NO
     - SQL server License: YES (have to calculate)
     - Storage: 10 TB

- Windows Based Server: Two dedicated Windows 2016 servers
  1) First Server: for running the ERP
     - Operating System: Windows
     - Model: DELL EMC R940xa
     - Ram at least: 8GB*8 = 64GB or 8GB*16= 128GB
     - Ram Type: DDR3
     - Processors: Core i7(at least 7th generation)
     - Internet Bandwidth: 10Mbps
     - SSL Certificates
     - Yearly Operating System License fee: YES
     - SQL server License: YES (have to calculate)

- Storage: 10 TB

2) Second Server: for taking backup or use a secondary point to keep the system up and running.
   - Operating System: Windows
   - Model: DELL EMC R940xa
   - Ram at least: 8GB*8 = 64GB or 8GB*16= 128GB
   - Ram Type: DDR3
   - Processors: Core i7(at least 7th generation)
   - Internet Bandwidth: 10Mbps
   - SSL Certificates
   - Yearly Operating System License fee: YES
   - SQL server License: YES (have to calculate)
   - Storage: 10 TB

b. Client Side
   - Code i3 Laptop or Desktop with 4GB Ram or higher version

ii. Software Components

a. Server side
   - Ubuntu Server or Windows Server 2016 or higher version
   - Docker server or Apache server
   - Dot Net Framework 5 or higher version
   - Visual Studio Software: Visual Studio is an integrated development environment for writing, compiling, and debugging the C# .NET code.
   - SQL Server 2019: SQL Server to create and maintain database records of the system.
   - SQL Server Management Studio: It is a software application first launched with Microsoft SQL Server 2005 that is used for configuring, managing, and administering all components within Microsoft SQL Server.
   - NodeJS: Node.js is an open-source, cross-platform, back-end JavaScript runtime environment that runs on the V8 engine and executes JavaScript code outside a web browser.
   - Git: Git is software for tracking changes in any set of files, usually used for coordinating work among programmers collaboratively developing source code during software development.
   - Microsoft IIS Web Server and Apache Web server to deliver HTML content to the system users.
   -

b. Client Side
   - Close source (windows 7, 8, 10) or open source (Ubuntu, Linux) operating system.
   - Web browser (Mozilla Firefox, Google chrome, Internet explorer) latest version
   - Internet connectivity

2.5 DESIGN AND IMPLEMENTATION CONSTRAINTS

- The information of all crew for a particular must be stored in database.

- Microsoft .NET technologies will be used for development and SQL Server will be used as an engine and database.
- CrM is a web-based system, and it must be running 24 hours a day.
- Users may access from any computer that has browser and Internet connection.
- Users must have their correct usernames and passwords to enter their online accounts and do activities.
- The ACAA Software and Information Technology Technical staff will be responsible to maintain the delivered system.

2.6 USER DOCUMENTATION

User Manual Guide: A guideline for new users on how to use the CrM. This guide outlines the best practices for training a new user to use the system appropriately. In addition, training programs will be provided for the system users.

Technical Manual Guide: Technical manual document will be used by technical staff of ACAA for the system maintenance. Moreover, training sessions will be conducted for the technical staff.

2.7 ASSUMPTIONS AND DEPENDENCIES

It is assumed that the CrM system will work correctly with windows and Linux operating systems environments.

The following dependencies shall be there after system implementation in ACAA: -

- Agreement and support from senior management in other to use system.
- ACAA staff in various departments must have Computer in their office to use system.
- Network infrastructure must be there to provide connectivity from end user to sever.
- ACAA staff should know the usage of CrM to store daily data related to crew for a particular flight.

3 EXTERNAL INTERFACE REQUIREMENTS

3.1 USER INTERFACES

The users will interact with CrM through a web-based interface. There shall be a friendly user interface for non-technical and technical users. In addition, an error web page will be used for unexpected system operations stating the cause of the error.

3.2 HARDWARE INTERFACES

The CrM is a web application, and for normal function of the system, it needs to interact with a Web server, Database server, Storage server, and required hardware to support operating system in server computer.

3.3 SOFTWARE INTERFACES

CrM System is a web-based system where it consists of client-web portal and management web-portal for the airlines and ACAA's employees, respectively. The client-web portal connects with the database to view the status (approved/rejected) of crew for a particular flight. The verification will be given based on licenses of crew. CrM will send email notification to the airline as well. The communication between the database and the management-web portal consists of operation concerning validating crew for a flight and generating reports.

3.4 COMMUNICATIONS INTERFACES

The architecture for communication shall follow the client-server model. The communication between client and server shall be maintained using a REST compliant web service and must be served over HTTPS protocol and the communication must be stateless. The FTP protocol shall be used to transfer files between client and server.

4 SYSTEM FEATURES

This section of the SRS describes requirements for the system's features.

4.1 CREW MANAGEMENT

4.1.1 Description and Priority

The airline shares their general declarations which contains the details of assigned crew to the flight. This data will be automatically shared through an integration between the airline system and ACAES. The crew licenses will be validated by the system and the status will be shared in the client web portal to the airline. Besides that, the airline will receive email notification as well for the crew status. The license details of a crew will be shared from Safety Management System.

4.1.2 Stimulus/Response Sequences

- Stimulus: Airline will share General Declaration crew data through an integration.
- Response: System saves the data to the database and automatically verify the status of crew.
- Stimulus: Airline will request to view the status of crew for a particular flight.
- Response: System displays the status of crew as approved or rejected.
- Stimulus: If rejected, airline will request to change that crew.
- Response: System saves the updates to the database and verify the status of changed crew.
- Stimulus: if rejected, airline will request to update the crew license.
- Response: System will forward the request to Safety Management System.

4.1.3 Functional Requirements

REQ: -1. Airline should be able to update crew for a particular flight.

REQ: -2. System integration should be there between the airline and ACAA's system.

REQ: -3. ACAA should be able to view the details and list of crew for a particular flight.

REQ: -4. System should generate reports, such as crew details for any flight in the past, report to know when that assigned crew had last shift and reports for the status (license validity and expiry date) of crew licenses.

5 OTHER NONFUNCTIONAL REQUIREMENTS

5.1 PERFORMANCE REQUIREMENTS

Crew Management System must be interactive and there must be less delays in each action-response of the system. There should be low delay in performance and below 2 seconds while viewing the data, popping of error messages, saving the sessions or settings, and generating reports.

5.2 SAFETY REQUIREMENTS

Information should be securely transmitted to the server without any changes. The system must secure the sensitive data. In addition, to improve the performance, the data should be divided into sensitive data and insensitive data. The insensitive data can be retrieved rapidly, and the sensitive data is encrypted/ decrypted using Encryption algorithms. Moreover, the following safety and protection should be considered: -

- User should be prevented, to the extent possible, from entering wrong data. Such as:
    - No letter should be inserted on numeric fields.
    - System should pop up a proper message if sensitive information is not entered.
- System should only be able to upload files in Excel, PDF, JPG format, and file with EXE and BAT formats should be prevented.
- User should enter his password after the first log in.
- System should prevent accepting simple password.

5.3 SECURITY REQUIREMENTS

There must be proper security mechanism for the system to avoid possible hacking of the system. The following web security practices should be considered in the development phase.

- Sanitize inputs at the client-side and server-side.
- Encode request/response.
- Use HTTPS for domain entries.
- Use only current encryption and hashing algorithms.
- Do not allow for directory listing.
- Do not store sensitive data inside cookies.
- Check the randomness of the session.
- Set secure and HttpOnly flags in cookies.
- Use TLS not SSL.
- Set strong password policy.
- Do not store sensitive information in a form's hidden fields.
- Verify file upload functionality.
- Set secure response headers.
- Make sure third-party libraries are secured.
- Hide web server information.

In addition,

- Different and adequate system access levels should be defined.
- Different users such as director, manager, employee, and other officials should have special access to the system.

- System data should be accessed to users in a safe way and only based on rights.
- All log in steps and processes should be carried out under SSL protocol in an encrypted manner.
- Users' personal data should be stored on an exclusive server in an encrypted and protected way.

5.4 SOFTWARE QUALITY ATTRIBUTES

5.4.1 Availability

While saving the information to the system in case the internet service gets disrupted, the information or files can be saved again.

5.4.2 Usability

The system should be easy to handle and should operates in the most expected way with no delays. In addition, it should perform according to needs and transverse quickly between its states.

5.5 BUSINESS RULES

The ACAA top management and employees must have access to the system according to their duties and responsibilities. The ACAA policies and regulations must be considered while defining access levels for the ACAA staff. In addition, the airlines should be provided an account as a user to view the status of crew for upcoming flights that is been shared for the departure flights. Hence, there are three types of users to the CrM, such as super admins who are having access to the whole system and system configuration, admins who are the top management of ACAA, user accounts for ACAA staff and user accounts for airlines.

6 OTHER REQUIREMENTS

6.1 MAINTENANCE

- Software should be developed in a standard way.
- Clarity and readability of source code should be preserved.
- Technical documents about system development should be provided to ACAA.

6.2 DOCUMENTATION

- In addition to given project, all documents should be delivered written.
- After project delivery, online back-up will kick start.
- A CD containing all information about system capabilities along with step-by-step approach will be delivered.

6.3 USABILITY

- System should be developed as generally expected with learning facilitation.
- System should instruct user to undertake different functions of the system.

6.4 TRANSFERABILITY

- Users and system data should be stored in a central room at ACAA using the software; and connection to central database will be possible by installing system on another server.

6.5 SYSTEM USE AND DISSEMINATION RIGHTS

- The system will be designed to be used by ACAA and HKIA airport of Afghanistan. All its rights will be reserved for ACAA, and no other person or agency will have commercial rights or system code to the system. ACAA has the right to change the code and project structure, after it is delivered.

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Appendix A: Analysis Models

1. Entity Relationship Diagram

Figure 3: CrM Entity Relationship Diagram


Civil Aviation Authority
Isalmic Republic of Afghanisan