WEAPON AND TROOPS DATA MANAGEMENT SYSTEM

By

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ABSTRACT

Weapon and Troops data Management System is a software system that enables troops to issue their own weapon, mean while Company commander and Adjutant can monitor all this activity. Company commanders and adjutant can view sheetroll of troops. It aims to minimize the time constraint and avoid the gray areas during issuance of weapons. The system keeps record of each soldier and allow authorities to instantly view sheetroll of each soldier instead of checking it manually in office files.

The Weapon and Troops Data Management System is a software system that can run on top of any Windows operating system. It has three modules including finger print scanner, and record keeping. Two of the modules are available for use of Troops and kote's NCO and the record keeping by Adjutant, Company commanders and data cell clerk.

CERTIFICATE FOR CORRECTNESS AND APPROVAL

Certified that work contained in the thesis –Weapon and Troops data Management system carried out by **LT Saeed Ur Rehman** and **GC Iyaz Mahmood** in supervision of **Lec Ayesha Naseer** for partial fulfilment of Degree of Bachelor of Software Engineering is correct and approved.

Approved by

Lec Ayesha Naseer

CSE DEPARTMENT

MCS

DATED:

DECLARATION OF ORIGINALITY

No portion of the work presented in this dissertation has been submitted in

Support of another award or qualification either at this institution or elsewhere.

DEDICATION

In the name of Allah, the Most Merciful, the Most Beneficent

To our parents, without whose unflinching support and cooperation,

a work of this magnitude would not have been possible.

ACKNOWLEDGEMENTS

We would like to thank Allah Almighty for His incessant blessings which have been bestowed upon us. Whatever we have achieved, we owe it to Him, in totality. We are also thankful to our families for their continuous moral support which makes us what we are.

We are extremely grateful to our project supervisor **Lec Ayesha Naseer** from MCS who in addition to providing valuable technical help and guidance also provided us moral support and encouraged us throughout the development of the project.

We are highly thankful to all of our teachers and staff of MCS who supported and guided us throughout our course work. Their knowledge, guidance and training enabled us to carry out this whole work.

Finally we are grateful to the faculty of Computer Software Department of the Military College of Signals, NUST.

In the end we would like to acknowledge the support provided by all our friends, colleagues and a long list of well-wishers whose prayers and faith in us propelled us towards our goal.

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CHAPTER:1

INTRODUCTION

1 INTRODUCTION

1.1 Overview

Weapon and Troops data Management System is a software system that enables troops to issue their own weapon, mean while Company commander and Adjutant can monitor all this activity. Company commanders and adjutant can view sheetroll of troops. It aims to minimize the time constraint and avoid the gray areas during issuance of weapons. The system keeps record of each soldier and allow authorities to instantly view sheetroll of each soldier instead of checking it manually in office files.

The main purpose of this project is the development of a system that would allow soldiers to issue their weapons avoiding the grey areas in manual issuance of weapon. And allow the officers in a unit to check the data of soldiers through this software instead of looking them in traditional office

1.2 Problem Statement

The purpose is to replace the issuance of weapon on firing day by a software system instead of manual procedure which would save a lot of time and will cover the grey areas and problems which happen during traditional procedure. It will help the Adjutant and company commanders to view the data of soldiers on their screen instead of viewing it in files kept at clerical office.

1.3 Approach

The main focus of the project is to provide a mean to the soldier to issue their weapon which will save time and will avoid the problems which happen in manual procedure. The Results will be accurate as any unauthorized issuance of weapon will generate and alert which will also be forwarded to the authorities of unit.

1.4 Scope

The project aims at developing a System for soldiers and officers of unit to make their tasks easy and in less time. This system provides an intuitive and interactive menu structure that allows the soldiers of unit to issue only their own weapon and allows the officers of unit to view the data of any soldier , which can be added, edited or deleted by the data cell clerk as well as by the data cell clerk.

1.5 Aim & Objectives

The objectives of project include:

Using software engineering techniques for gathering requirements during the development process, designing the software, implementing and testing requirements gathered.

To learn interactive web development

To learn hardware integration with software.

To learn database design and development

To learn data transfer through networking**.**

1.6 Contributions:

The project has passed its initial three interims and is ready to be displayed at Open house on May 17th 2017

This is a unit level project and can be implemented in any unit of Pakistan Army.

1.7 Organization

The first part of thesis is the abstract which describes the main details of Weapon and Troops data management System, followed by the introduction section which specifies the problem statement, approach, scope and objectives. The literature review section state the various resources read online before the commencement of the project. They include learning about this software system. The design and development part illustrate the diagrams which describe the detailed design of the Weapon and Troops data management system its components, interfaces and data necessary for the implementation phase. The analysis and evaluation part give details of the black box testing, unit testing and system integration testing; actual results against expected results. The future work gives states the enhancements that can be applied to the application.

1.8 Deliverables

Table 1-1 : Deliverables

Deliverable Name	Deliverable Summary Description
Software Requirements Specification(SRS) Document	Complete Description of **what** the system will do, who will use it. Detailed description of functional and non-functional requirements and the system features.
Design Document	Complete description of **how** the system will be implemented i.e. the detailed design.
Code	Complete code with the API.

Testing Document	The whole system is tested according to the specification described in the SRS document. Black box, unit and System integration testing is done.
Complete System	Complete working system.

CHAPTER:2

LITERATURE REVIEW

2 LITERATURE REVIEW

The product uses data from two hardware devices that are RFID reader and finger print scanner . Firstly we needed to study about these two systems (RFID and Finerprint scanner) that how they work. Secondly Data is retrieved from these two devices . Data retrieved are in the form of JSON format which is then compared with the data stored in hardware to get authentication that RFID and finger print has matched. Then we get the reply of authentication on Arduino display.

2.1 How it works??

This system is made using **nodejs**, the system from end to end is total javascript,

The server side is running socket.io and for templating and rendering data **hapiJs** is being used. **socket.io** is used so that the application can be made real time and data can be updated on the views without the need to be refreshed. A socket is opened up on the server side that the client attached itself to, when ever a change is occurred in the dataset, the socket.io client pushes the relevant data to all the clients that have subscribed to that particular socket.

For the front end **ReactJs** has been used, **reactjs** is a nodejs based data templating engine used to build responsive web applications, it was developed by facebook and is now becoming the common standard for all front end web development .

Moving on to how the application was designed to work on using Model Controller Whatever Design or MC*. This means that there are no hardcoded views of the project, the back end and the front end are completely modular and independent of each other. MC* Pattern requires the programmer to expose Restful APIs instead of hardcoded

views, these Restful APIs can be used with any data rendering technology to perform CRUD(Created update Read Delete)operations. These can now be used in android Views or as in our case web views (Reactjs).

2.2 Where the data is stored??

The data is stored in a document database also know as **noSql** database named **MongoDb**, noSql database do not have a schema and store data in the form of JSON (JavaScript Object Notation) Objects. The File that is responsible for db operations is in the folder models, namely files are person.js, soliderFinger.js. The person.js file stores the details of a solider and the finger stores the record of the finger print. The operations that are performed on the database are conducted using mongoose (a Node package), it is basically a database connector.

Further more the all the Apis are defined under the folder server/api.js. The api.js exposes all the apis and the operations that are to be performed under their relative paths or routes. The routes of the application that is how the application is to navigate and how the APIs are to respond to request are defined in a file called routes.js

Rest the Front end is made using Reactjs and bootstrap, the theme can be changed by importing a different CSS file in the file named index.html in the client folder The Arduino microcontroller uses addfruit library for finger print sensor and MCR5 library for RFID tag recognition.

CHAPTER:3

OVERALL DESCRIPTION

3 OVERALL DESCRIPTION

This part of the document contains information about the product, its features,

perspective, users' characteristics and constraints.

3.1 Introduction

3.1.1 **Purpose**

The purpose of the Software Requirements Specification (SRS) for Troops data and weapon management system is to give the administrators and users the ability to monitor the issuance of weapons at kote's area on firing day and to view the data of any soldier on their screen instead of viewing it manually on sheetroll .Soldier and the other users will be able to issue their own weapon only using the product.

This document is aimed to eliminate ambiguities and misunderstandings that may exist. For the user, the SRS will explain all functions that the software should perform. For the developer, it will be a reference point during software design, implementation and maintenance.

This document encompasses the requirements for version-1 of Weapon and Troops Data Management system. The main purpose of this project is the development of a system that would allow users to perform issuance of weapons in a short period of time avoiding the gray areas and would allow the administrator to view all this activity.

3.1.2 Intended Audience and Reading Suggestions

The intended readers of the SRS are the Unit authorities (Commanding officer , adjutant) who will have the system implemented as well as development team. This document serves as an agreement between both parties (Development team and the Unit authorities) regarding the product to be developed.

- **Adjutant , Company Commander , Data cell clerk:** The users of the system shall get a clear idea of the software and hardware requirements that are to be specified.

- **Developers:** Project developers have an advantage of quickly understanding the methodology adopted and personalizing the product.
- **Testers:** The testers of the system can check user requirements from this SRS and develop test scenarios accordingly.
- **Documentation writers:** The document can serve as a future reference for other versions of the SRS.
- **Project Testers:** Project testers can use this document as a base for making test cases.

3.1.3 Reading suggestions

It would be suggested to the clients to go through the requirement section thoroughly.

For the developers it is suggested that they read and understand the product scope, overall description and system features thoroughly.

Testers should go through the operating environment, constraints, and the non-functional requirements before developing the test scenarios for the system.

3.1.4 Product Scope

The document only covers the requirements specifications for the Troops data and weapon management system. All the external interfaces and the dependencies are also identified in this document.

For **:** Adjutant , Company Commander , Data cell Clerk , kote's NCO and troops.

What **:** Covering the gray areas in issuance of weapons and keeping the sheetroll data of troops.

The **:** Troops data and weapon management system

Is **:** Software System

That : Avoids gray areas in issuance of weapons and keeps record of troops data.

The Weapon and Troops Data Management System shall provide a software system that would run on top of any Windows operating system. It has three modules including finger print scanner, and record keeping. Two of the modules shall be available for use of Troops and kote's NCO and the record keeping by adjutant , Company commanders and data cell clerk. It shall be a Windows based solution satisfying objectives such as:

3.1.4.1 Mechanism for taking input from fingerprint scanner.

3.1.4.2 Mechanism for taking input from RFID tags.

3.1.4.3 Keeping RFID and fingerprint data in database

3.1.4.4 Keep a record of sheetroll data of troops.

3.1.4.5 Event generating alarm on unauthorized issuance of weapon.

3.1.5 Abbreviations and terms

Adjutant: He is responsible for general administration and management of unit

Unit : An army unit usually consist of a headquarters and three or more companies.

Kotes : A place where small range weapons are placed.

NCO : Non commissioned officer.

RFID : Radio frequency identification.

Arduino : It is an open source project that created microcontroller-based kits for building digital devices and interactive objects that can create and sense physical devices.

Sheetroll : A folder or a file containing information about the soldier.

3.2 Overall Description

3.2.1 Product Perspective

To build a software system that will enable troops to issue their own weapon , mean while Company commander and Adjutant will be able to monitor all this activity. Company commanders and adjutant will be able to view sheetroll of troops. It aims to minimize the time constraint and avoid the gray areas during issuance of weapons. The system will also keep record of each soldier and allow authorities to instantly view sheetroll of each soldier instead of checking it manually in office files.

3.2.2 Product Functions

The main features of the Weapon and Troops data management system are highlighted below:

- A main menu - for navigation
- Retrieval of Soldier sheetroll data and biometric results from database over the network
- View for displaying results.
- Allow Users to save the records for later use
- Allow taking a print of the results.

3.2.3 User Classes and Characteristics

The System will be available for use by Adjutant and Company Commanders but only authorized persons will be allowed to view , alter or enter records of troops.

Therefore, users will be divided into following categories:

Adjutant will prepare the system for Company commanders to allow them to issue their weapons and clerks in data cell to work on sheetrolls.

1. He will monitor the issuance of weapons.

2. He will be able to view the sheetroll of any soldier when required.

Company commander

1. He will permit kote of his company to start the issuance.

2. He will monitor the state of weapons of kote of his company

Data cell clerk would be able to perform data entry in sheetroll as well as view and alter the records already stored. A password will required by him to perform all these activities.

Kotes NCO would supervise the issuance of weapon , he will ensure that each soldier gets his weapon after putting his thumb impression on finger print scanner and the Arduino LCD doesn't show any alert

3.2.4 Operating Environment

The product will run on all Operating Systems supporting PHP 5+ and web browser (chrome or firefox) . The main product can be installed on personal computers after they have been connected to network

3.2.5 Design and Implementation Constraints

- The application will run on devices having a minimum of total 2 GB RAM (500 MB required maximum for the application itself).
- Connections to the unit network should be available
- Application databases will be integrated with RFID and finger print scanner to store RFID and fingerprint data.

3.2.6 User Documentation

A user manual will be included for the users in which instructions will be given on how to use the system.

3.2.7 Assumptions and Dependencies

Server has activated support for PHP and that all files ending in .php are handled by PHP.

3.3 External Interface Requirements

3.3.1 User Interfaces

- Main menu for navigation
- User interface for Adjutant
- User interface for company commander and data cell clerk.
- Weapons issuance activity will be viewed in list view.
- Sheetroll of troops will be shown in form view.

3.3.2 Hardware Interfaces

- Connectivity to unit network through, LAN etc
- RFID system to track the presence of absence of each weapon in kote's.
- Fingerprint scanner for thumb impression of troops.
- Printer to print the sheetroll data of any soldier.

3.4 System Features

- Adjutant will view the main menu of the application.
- Application will be able to access data from server to authenticate the issuance of weapon.

- Company commander will view the activity of his company in a list view
- Adjutant and Data cell clerk can view update or alter the sheetroll data of any soldier.
- The instructions shall be visual

3.4.1 Accessing the Main Menu

Description and Priority

After starting the system user will first see main menu.
User will be able to access the weapon issuance activity through this main screen. It's priority will be medium.

Stimulus/Response Sequences

1. Start the System.
2. Display main menu

Functional Requirements

REQ-1: The product must be properly installed on the computer system.

REQ-2: The different option available shall be:

- Start weapon issuance at company A.
- Start weapon issuance at company B.
- Start weapon issuance at company C.
- View sheetroll.
- Exit

3.4.2 Authentication

RFID data and fingerprint data will be sent in a request to server for authentication to check if a soldier is authorized to issue that weapon or not.

Description and Priority

The authentication for the issuance of weapon holds a high priority since it is a core feature of this product.

Stimulus/Response Sequences

- Soldier will puts his thumb impression on fingerprint scanner and takes his weapon out of RFID reader range.
- This data will be collected at Company commander's end and will be send to server in a request.
- Server will send a reply to company commander which will be displayed at Arduino LCD module present at kote.

Functional Requirements

REQ-3: Alert will be generated at company commander screen and at Arduino LCD module if any unauthorized issue of weapon takes place.

REQ-4: Weapon issuance procedure will continue to work even if alert is generated due to issuance of unauthorized weapon..

REQ-5: Alert message will be only be displayed on LCD screen if unauthorized issuance of weapon takes place.

3.4.3 View Results

Description and Priority

Company commander will view the weapon issuance activity of his company and can view the sheetroll data of any soldier of his company1

Stimulus/Response Sequences

- Click on view activity display the list of activity.
- The company commander will be able to see the state of his company in the form of a list..
- Click on view data in the menu displays a page where he can enter the name or number of any soldier to view his details.

Functional Requirements

REQ-6: Company commander will be able to use the system only after entering the password.

REQ-7: When the system is ready to use , view kote's activity and view data buttons will be displayed on the screen.

REQ-8: Entering name and number of any soldier and then clicking on view activity button will display the sheetroll of soldier.

3.4.4 Work on Soldiers Record

Description and Priority

Data cell clerk can work on sheetroll data of any soldier

Stimulus/Response Sequences

- The user enters password after turning on the system.
- After authentication of password ,a menu is displayer (view data of soldier , update new entry)
- Entering a soldier army number takes user to View Result menu.

Functional Requirements

REQ-9: View of soldier's sheetroll data will be available for data clerk after entering the soldiers army number..

REQ-10: Data clerk will be able to update new entry in unit.

REQ-11: User will also be allowed to print the soldiers data.

3.4.5 Issue your Weapon

Description and Priority

The Help holds a medium priority. It will enable user to issue the authorized weapon using the product.

Stimulus/Response Sequences

- The user after picking the weapon from the shelf , puts his thumb impression on finger print scanner and moves out of kote. In case of unauthorized issuance by any soldier , alert will be displayed on LCD module.

Functional Requirements

REQ-12: Range of range RFID reader will be with in the kote.

REQ-13:When a weapon goes outside the range of RFID reader without authentication, an alert will be displayed on LCD module.

3.4.6 Help Menu

Description and Priority

The Help holds a low priority. It will contain all the instructions needed to use the product.

Stimulus/Response Sequences

- The user selects Help Menu from Main Menu or by pressing F1.
- An instruction manual is displayed to guide the user.

Functional Requirements

REQ-14: Pressing F1 or choosing Help option will show Instruction Manual.

3.5 Other Nonfunctional Requirements

3.5.1 Performance Requirements

In case of Weapon and Troops Data Management System, accurate results and high quality output is required for easy and authorized issuance of weapons.

3.5.2 Safety Requirements

The use of the software product has no harms whatsoever, nor does it have any possibility of loss or damage that might be inflicted during the use of the product. However, improper verification of soldier thumb print from the database may render the software useless. If the product crashes during any phase, there will be no change in the database.

3.5.3 Security Requirements

Special security measures are added to the product. All solider data can only be accessed by Adjutant , Company commander and Data cell clerk only after providing a secure password. Password cracking preventing techniques are used.

Product is not connected to internet to protect from malicious attacks.

3.5.4 Software Quality Attributes

Usability:

The product will be easy to operate for any user with minimum technical knowledge.

Accuracy:

To ensure reliability and correctness, there will be zero tolerance for errors in the algorithm that computes results.

Portability:

The product will be portable to any device with modern chorme or firefox browsers installed on it.

Availability

The product will be available from boot to shutdown, provided network is in working state and the hardware products are installed and configured properly.

Flexibility

The design and architecture of the product will be flexible enough for catering any new requirements, if any at some later stage or for the product enhancement.

Data Integrity

If the product crashes during any phase, there will be no change in the database.

Scalability

Multiple instance of the application can run at a time and multiple users can view the sheet roll to soldiers at a time.

Confidentiality

Sheetroll record and access to product will not be available to any non authorized personal.

3.6 Business Rules

- This is unit level project and product can be installed in units of Pak Army.
- Developers have right to keep the modules in the product for later use.

3.7 Other Requirements

- Newer Versions of the product will support previous database.
- Data of soldiers will not be made available by the unit for development team, it will be updated by the Data cell clerk after the product is ready.
- RFID tags will be embedded inside rifle in the presence of kote's NCO inside unit area.

CHAPTER:4

DESIGN AND DEVELOPMENT

4 DESIGN AND DEVELOPMENT

4.1 INTRODUCTION:

The purpose of the software system " Troops data and weapon management " system is to give the administrators and users the ability to monitor the issuance of weapons at kote's area on firing day and to view the data of any soldier on their screen instead of viewing it manually on sheetroll .Soldier and the other users will be able to issue their own weapon only using the product.

4.1.1 Purpose of the document:

The purpose of software design specification for "Weapon and Troops data management system " is to acquaint readers of this document with high level and low level design for the software to be built.

4.1.2 Scope of the Development Project

The document only covers the design for the Troops data and weapon management system. All the external interfaces and the dependencies are also identified in this document.

For **:** Adjutant , Company Commander , Data cell Clerk , kote's NCO and troops.

What **:** Covering the gray areas in issuance of weapons and keeping the sheetroll data of ttroops.

The **:** Troops data and weapon management system

Is **:** Software System

That : Avoids gray areas in issuance of weapons and keeps record of troops data.

The Weapon and Troops Data Management System shall provide a software system that would run on top of any Windows operating system. It has three modules including finger print scanner, and record keeping. Two of the modules shall be

available for use of Troops and kote's NCO and the record keeping by adjutant , Company commanders and data cell clerk. It shall be a Windows based solution satisfying objectives such as:

1 Mechanism for taking input from fingerprint scanner.

2 Mechanism for taking input from RFID tags.

3 Keeping RFID and fingerprint data in database

4 Keep a record of sheetroll data of troops.

5 Event generating alert on unauthorized issuance of weapon.

4.1.3 Definitions, acronyms, abbreviations

Adjutant : He is responsible for general administration and management of unit

Unit : An army unit usually consist of a headquarters and three or more companies.

Kotes : A place where small range weapons are placed.

NCO : Non commissioned officer.

RFID : Radio frequency identification.

Arduino : It is an open source project that created microcontroller-based kits for building digital devices and interactive objects that can create and sense physical devices.

Sheetroll : A folder or a file containing information about the soldier.

DB : Database

UI : User Interface

UML : Unified Modelling Language

4.1.4 Overview of the document

This document shows the design and working of WTDMS. It starts from higher level details for a non-technical reader to understand just by seeing the diagrams to the lower

level details that aid the developer to code and understand other technical details of the application.

Section 2 the *System Architecture Description* gives a detailed overview of the application. Section 2.1 *Overview of Modules/Components* shows the main component of the application and their inter-relationships. Section 2.2 *Structure and Relationships* shows the higher level details system working by the means of System Block, Activity, State Transition, and Use Case diagrams. Lower level details are described using the Class, Sequence diagrams 2.3 describes how the application is designed to curb the tendency of *User Interface Issues* and problems during User Interaction.

In Section 3, *Detailed Description of Component* is given to show the working of modules with low level details. It shows the purpose, function, subordinates, dependencies, interfaces, resources, processing and data of the components and their relationships with each other.

Section 4 shows the *Reuse and Relationship to other Products* i.e.; information about work done in the same project before and any reuse of the same work. The section also provides a key to reuse this system for further upgrades.

Section 5 *Design Decisions and Tradeoffs* shows the architecture style and design pattern of the application, while the *Pseudo Code* of the components is given in Section 6 for human reading rather than machine reading.

4.2 SYSTEM ARCHITECTURE description

This Section overview of application, its higher and lower levels details and user interfaces.

4.2.4 OVERVIEW OF MODULES/COMPONENTS

WTDMS comprises of following components:

1. Application UI
2. Process data
3. Data control

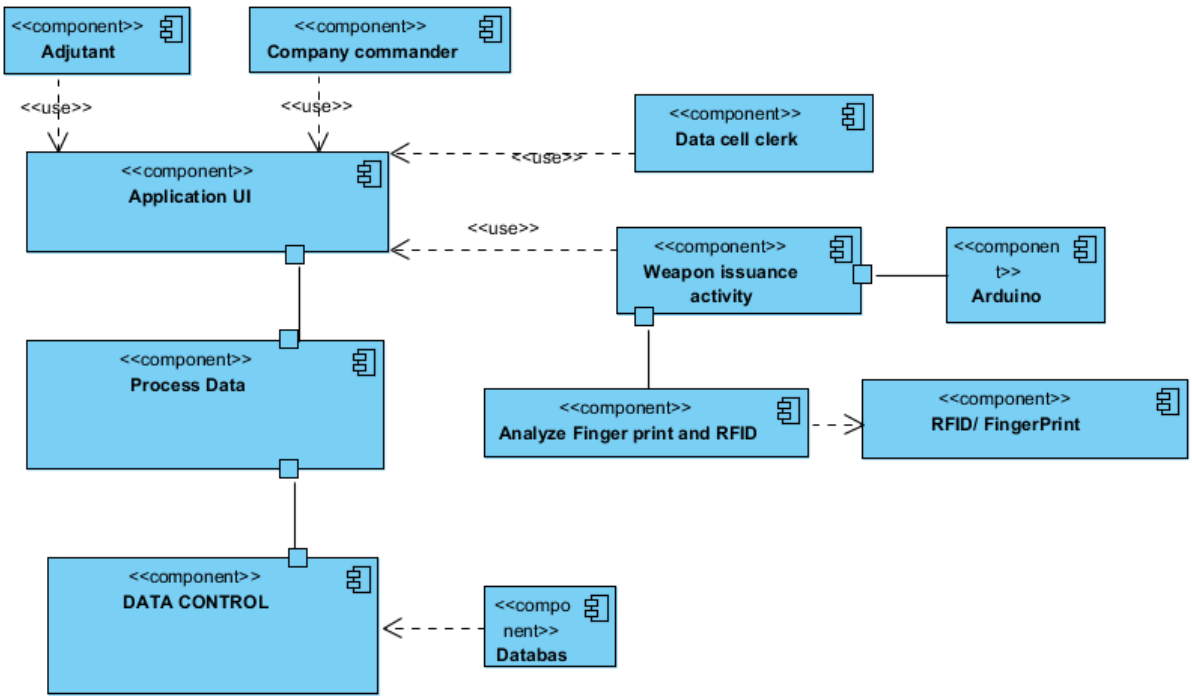


Fig. 2.1.1: *Component diagram for WTDMS*

Application UI acquires all its services from the Process Data module. The user interacts directly with this component and provides an input to the application specifying the action required. The component then displays an output according to that user action.

Process Data controls the flow of data between all three layers.

Data Control sits in the database layer of the system architecture and is responsible for keeping record of all soldiers in the database.

4.3 STRUCTURE AND RELATIONSHIPS

This section covers the overall technical description of WTDMS. It shows the working of application in perspective of different point-of-views and also shows relationships between different components.

4.3.1 System Block Diagram

This diagram shows the higher level description of the application. It shows generic working of the application and interaction with the user. In this application, User will interact with the UI of the application, UI will interact with the application logic which will then interact with database.

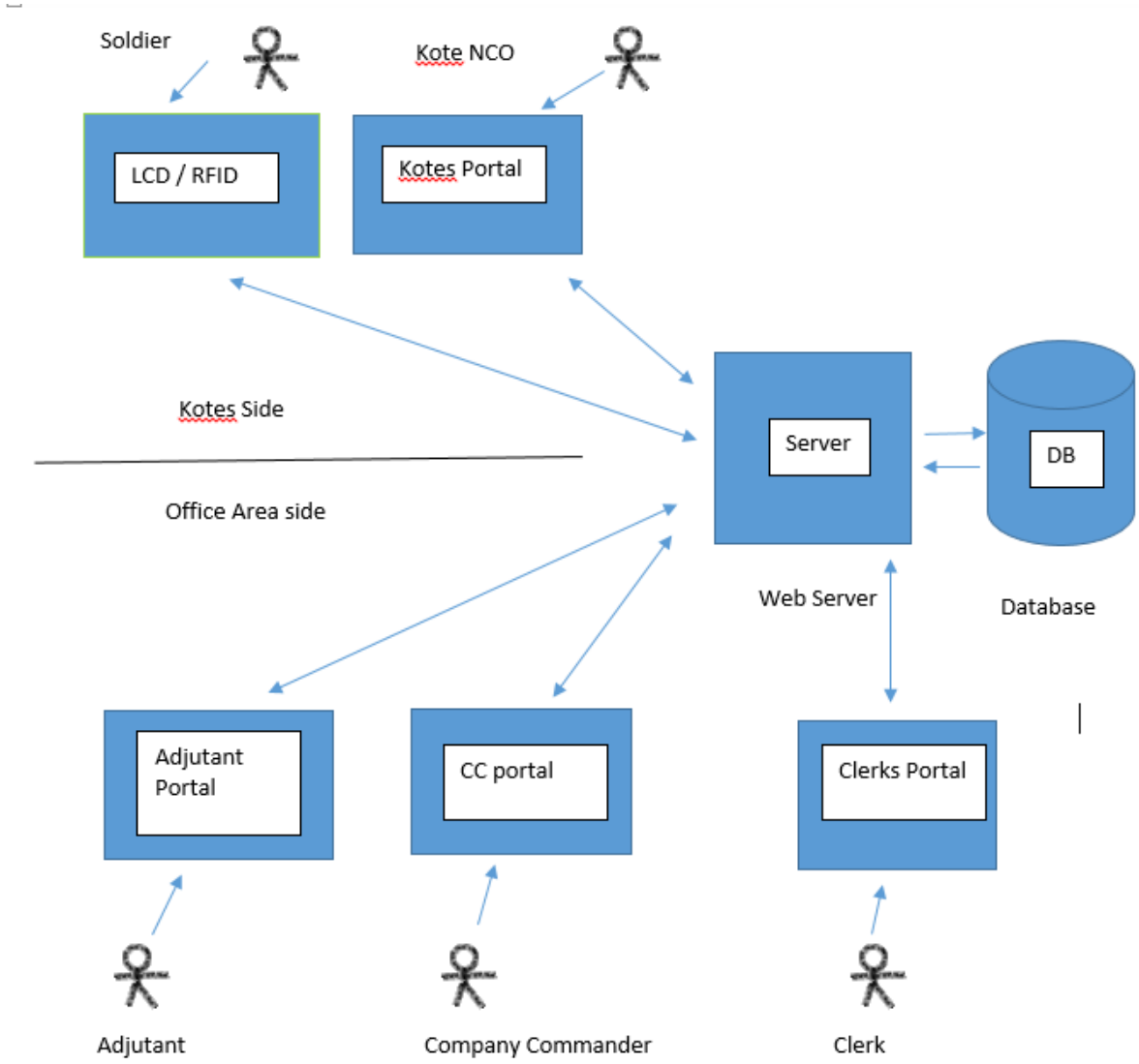


Fig. 2.2.1.1: *Block diagram for WTDMS*

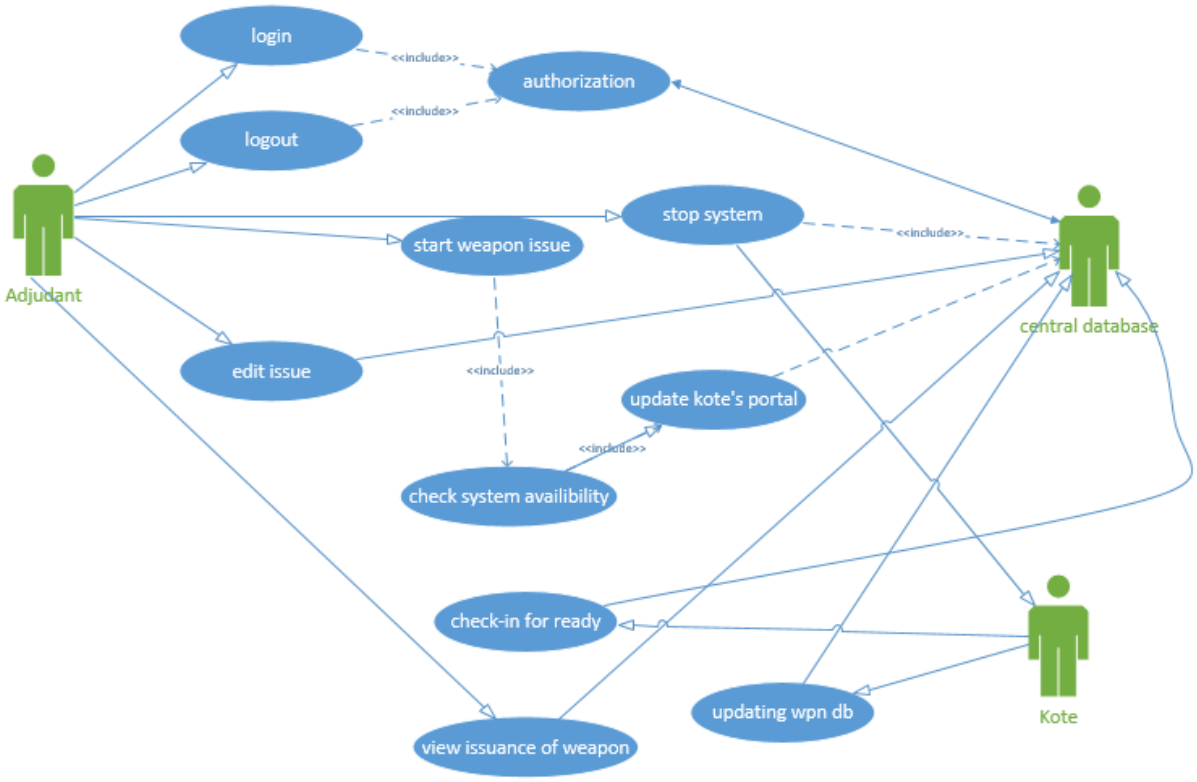
4.3.2 User view (use case diagrams)

Use Cases

1. Login
2. Adjutant viewing weapon issuance activity.
3. Adjutant viewing sheetroll.
4. Data cell clerk.
5. Administrator adding accounts and reset password
6. Kotes NCO
7. Soldiers getting weapons issued.
8. Arduino

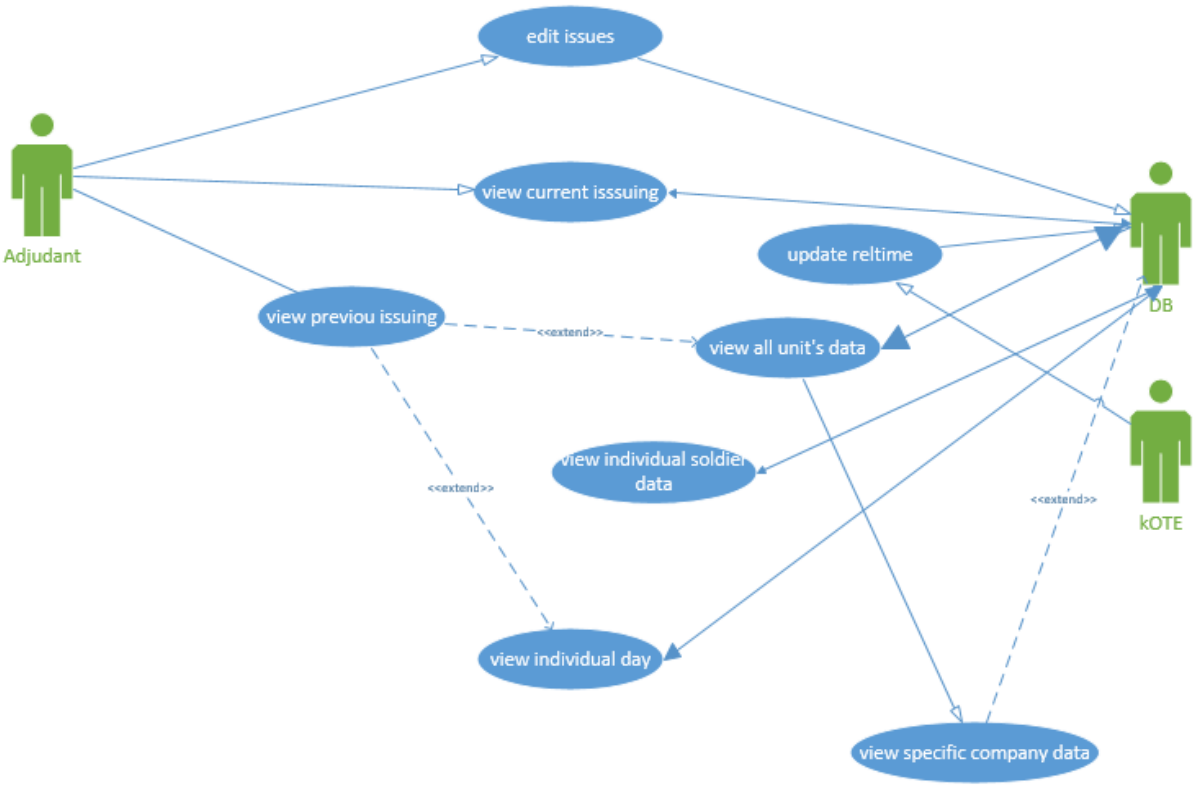
Use Case Description

Use Case 1



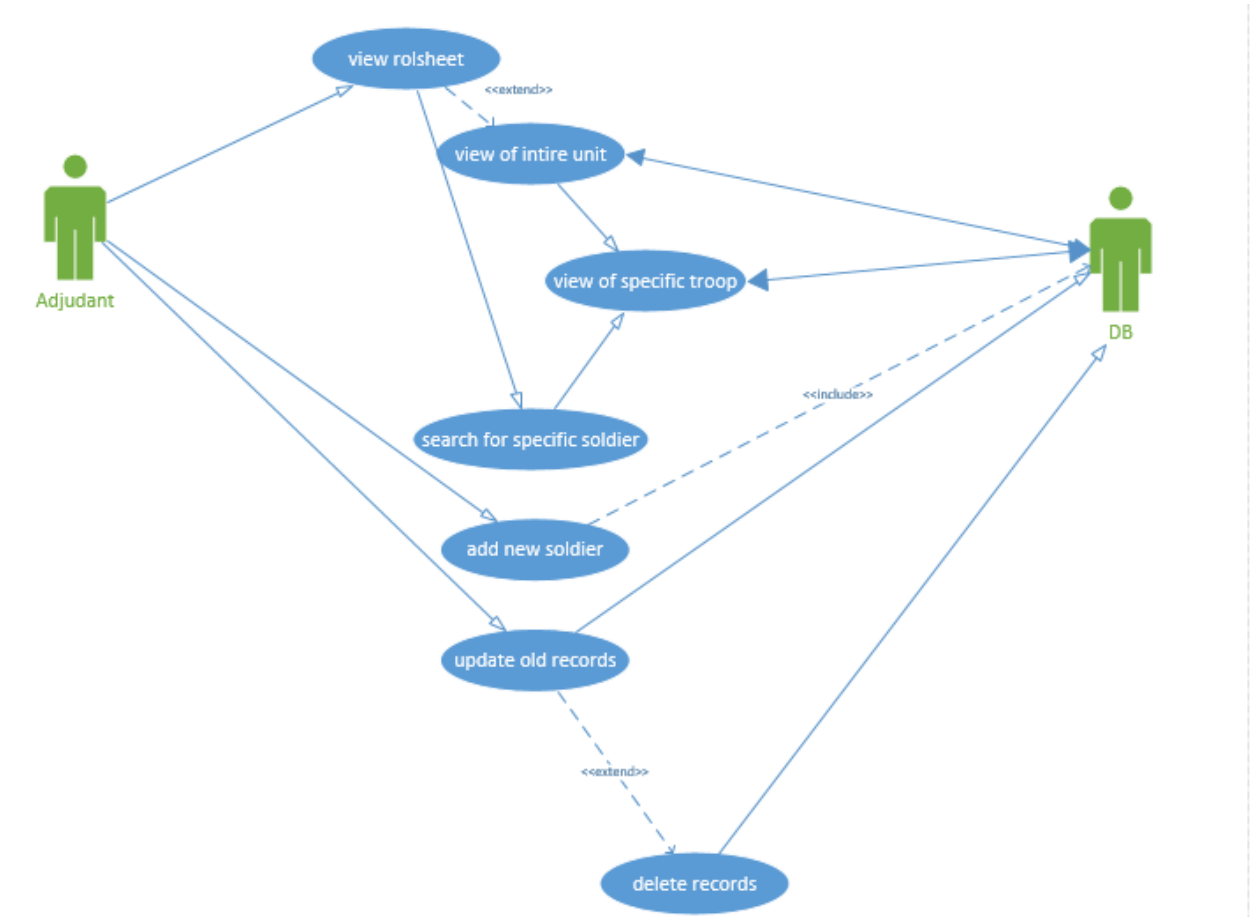
Use Case Name	Adjutant
Primary Actor	Adjutant
Secondary Actor	System/Database
Normal Course	• Enters his username • Enters his password • Clicks the login button to enter the application
Pre-Condition	System is not running (User is not logged in)
Post Condition	Successfully logins to the system and makes the system ready to use

Use Case 2



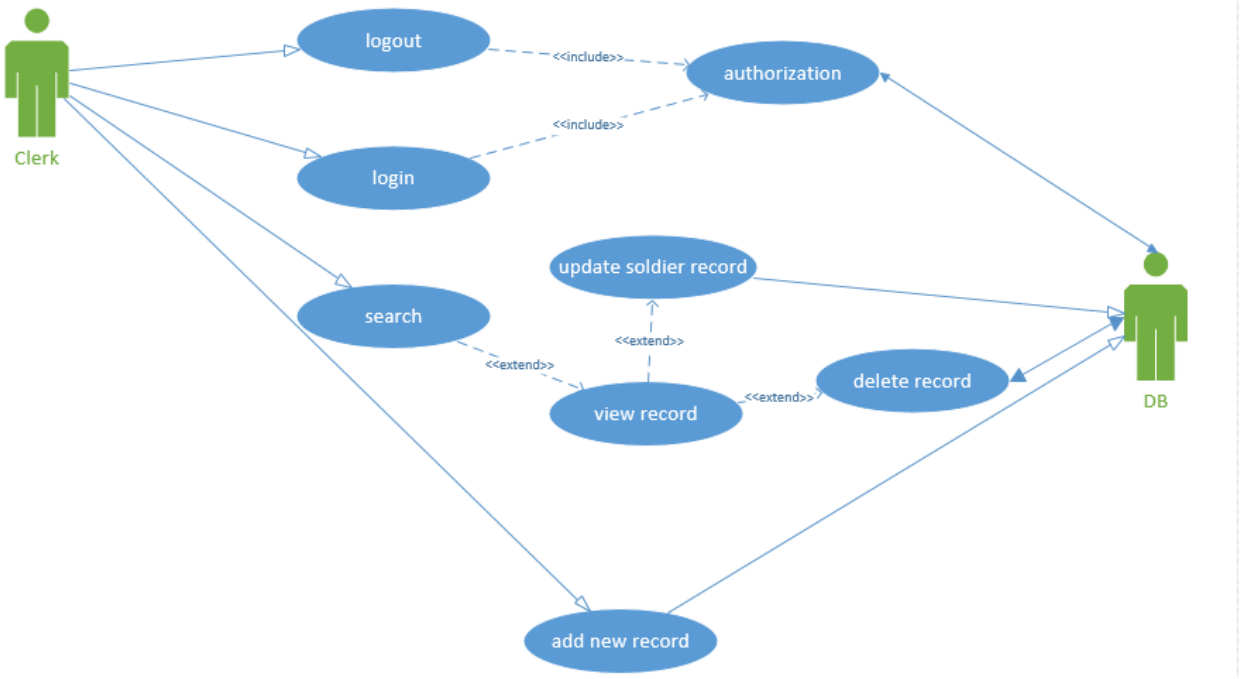
Use Case Name	Adjutant viewing weapons issuance activity
Primary Actor	Adjutant
Secondary Actor	Database
Normal Course	View and issue the weapons issuance activity and can view the previous activites.
Pre-Condition	Must be logged into the application before searching for a soldier.
Post Condition	Activity data is retrieved from the database

Use Case 3



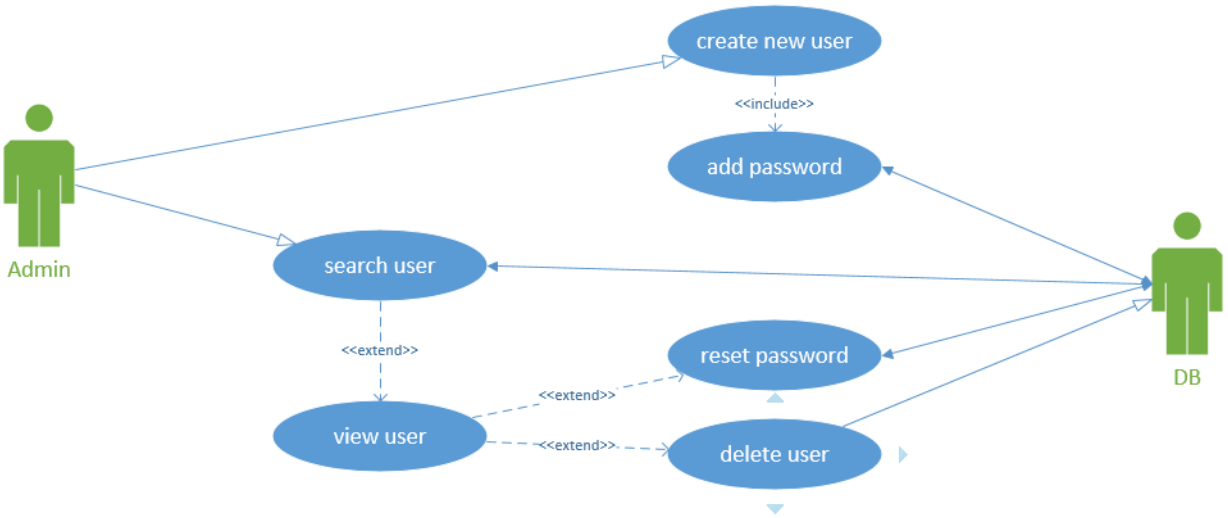
Use Case Name	Adjutant viewing Sheetroll
Primary Actor	Adjutant
Secondary Actor	Database
Normal Course	Clicks on View sheetroll button, can view and edit data on sheetroll.
Pre-Condition	Must be logged into the application .
Post Condition	Sheetroll data will be successfully retrieved from the database

Use Case 4



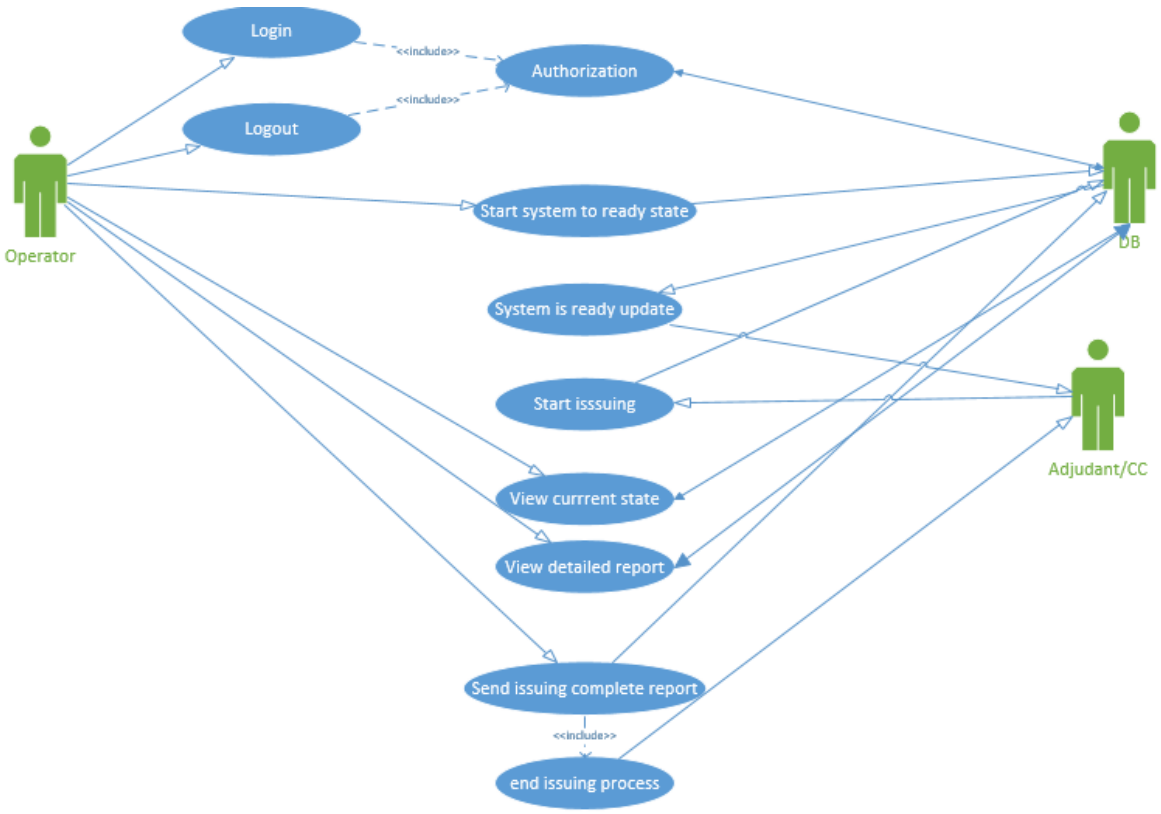
Use Case Name	Data Entry Clerk
Primary Actor	Data cell clerk
Secondary Actor	Database
Normal Course	After he is logged in , he can update and alter the records on sheetroll
Pre-Condition	System is ready to use and he is logged in.
Post Condition	View , update or alter the sheetroll
Assumptions	The data and record of sheetroll is successfully viewed , altered or removed from the database

Use Case 5



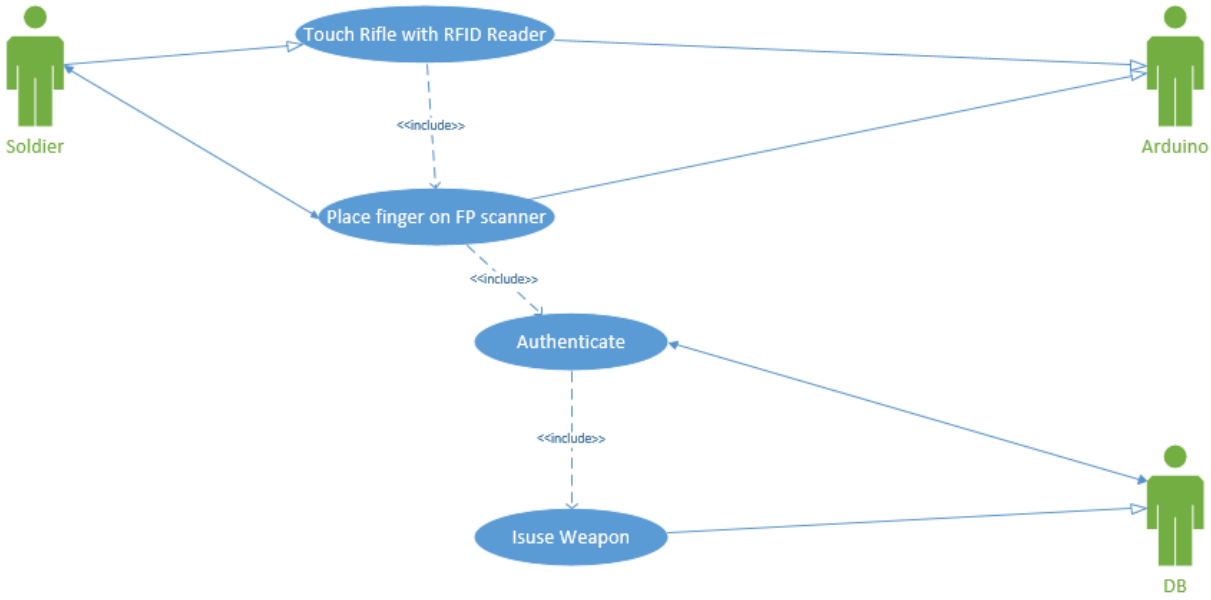
Use Case Name	Administrator adding accounts and reset password
Primary Actor	Adjutant
Secondary Actor	Database
Normal Course	He can add, delete new clerk, and can reset passwords.
Pre-Condition	System is ready to use.
Post Condition	New clerk , added or removed.

Use Case 6



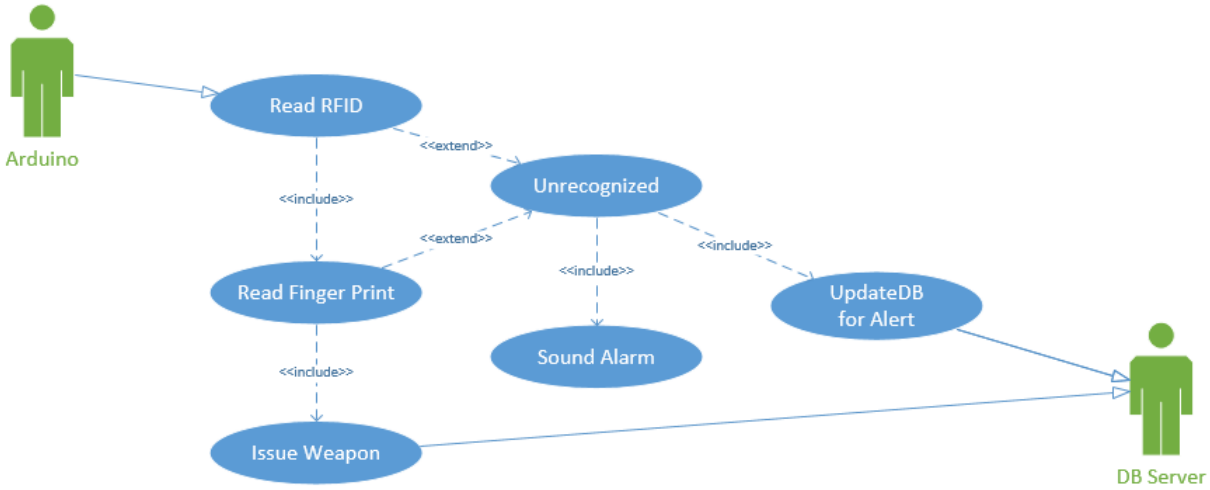
Use Case Name	Kotes operator
Primary Actor	Kotes NCO
Secondary actor	DB
Normal Course	Starts the weapon issuance activity.
Pre-Condition	System is ready to use and he is logged in
Post Condition	Weapon issuance activity can start.
Assumptions	Soldiers start issuing weapons.

Use Case 7



Use Case Name	Soldiers getting weapons issued.
Primary Actor	Soldier
Seconday Actor	Arduino , DB
Normal Course	Soldier can issue his weapon by putting thumb impression and RFID reader on rifle.
Pre-Condition	System is ready to use and adjutant , company commander has allowed weapon issuance activity.
Post Condition	Weapon is issued

Use Case 8

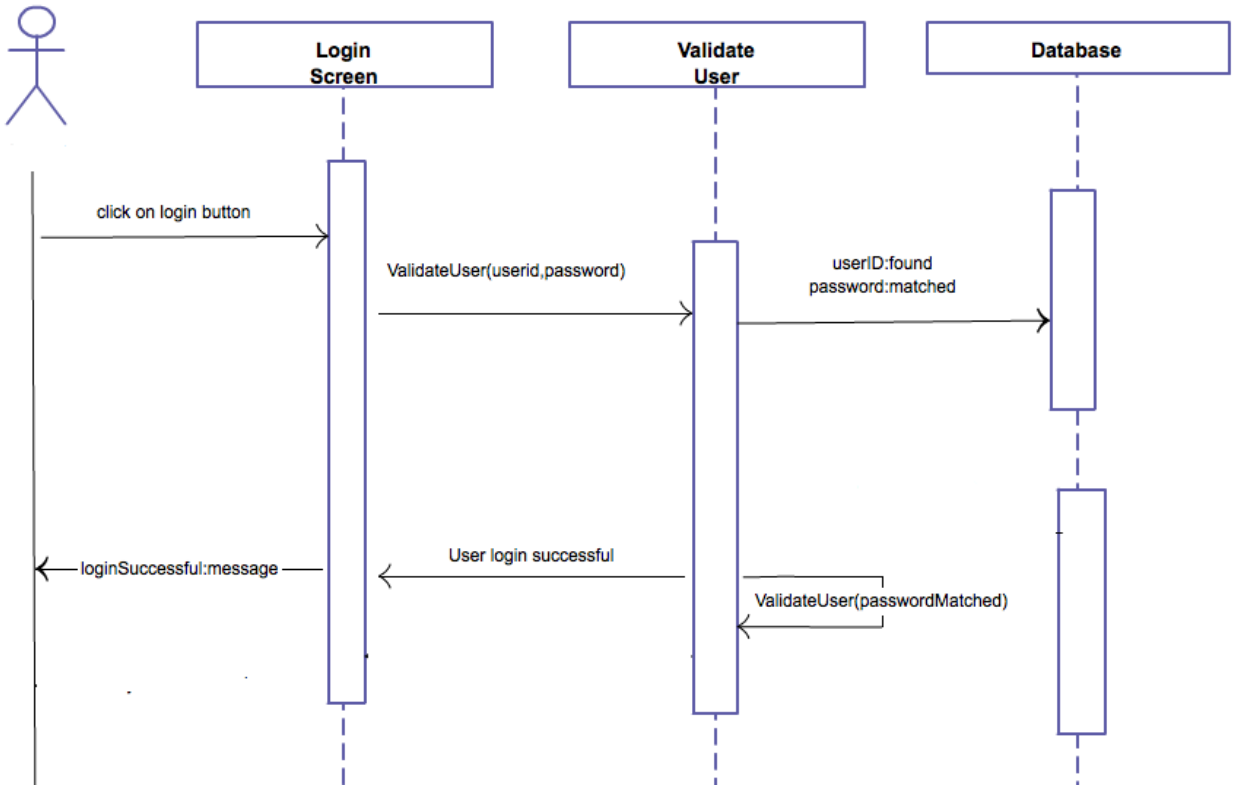


Use Case Name	Arduino issuing weapon
Actor	Database
Normal Course	Ardunio after authentication displays weapon issued message.
Pre-Condition	System is ready to use and adjutant , company commander has allowed weapon issuance activity
Post Condition	Display weapon issued /not issued message

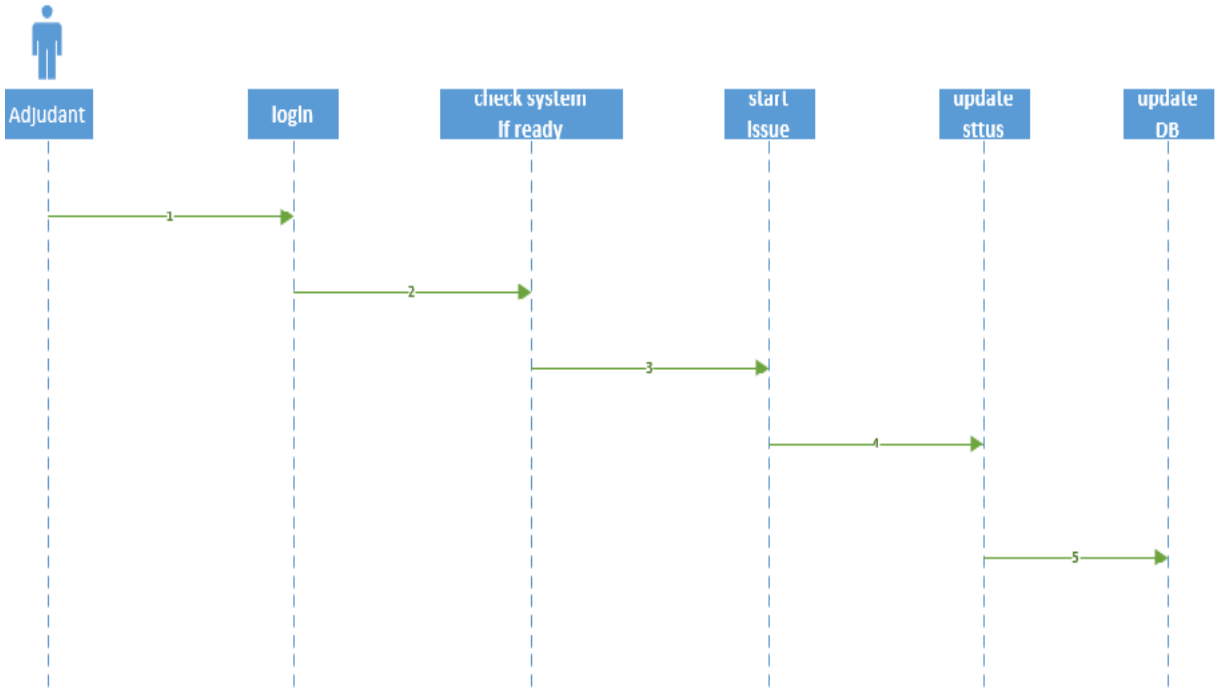
4.3.3 Sequence diagram

Sequence Diagrams of key use cases are mentioned below:

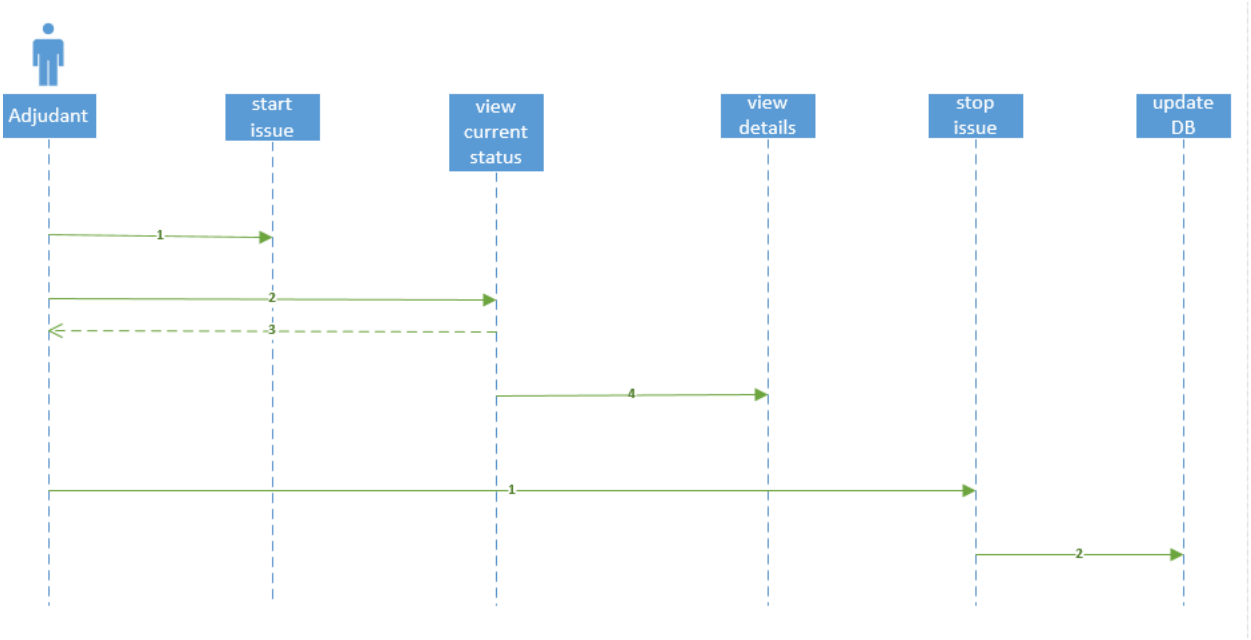
4.3.3.1 *Login*



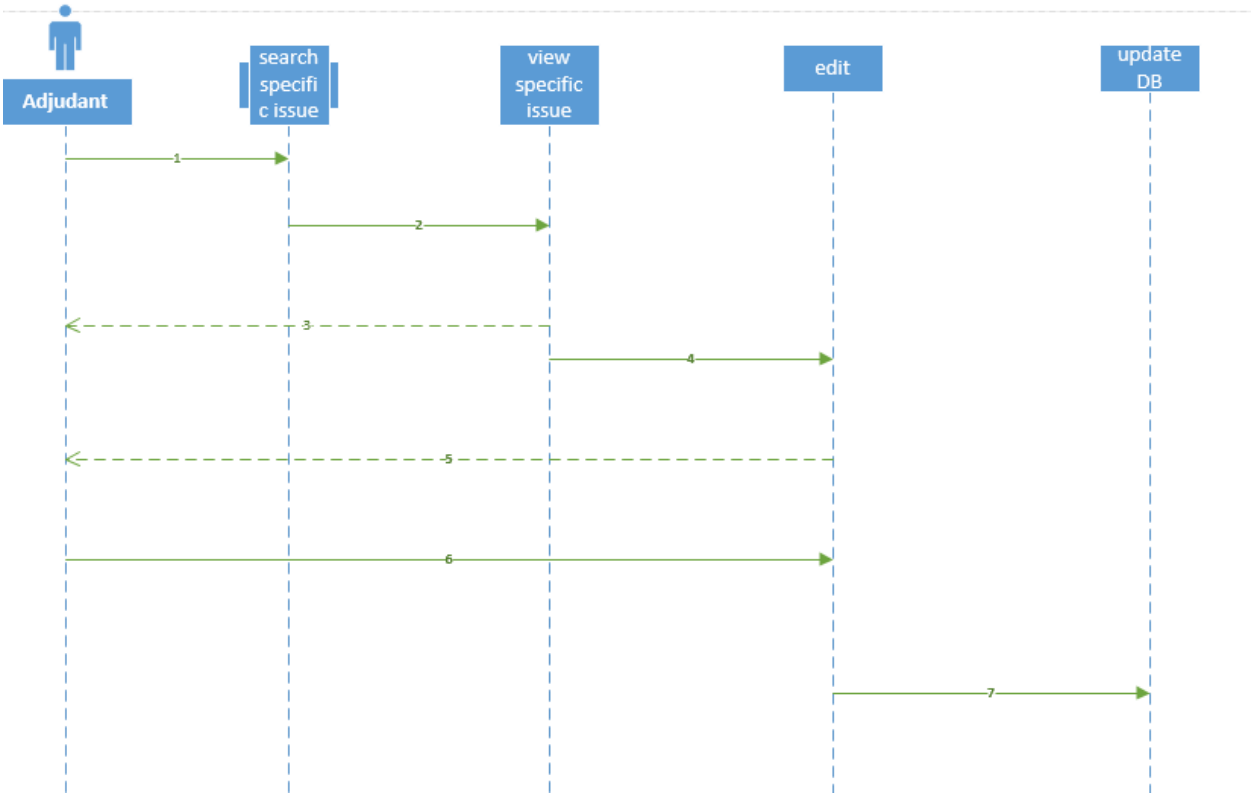
4.3.3.2 *Adjutant starting weapon issuance activity*



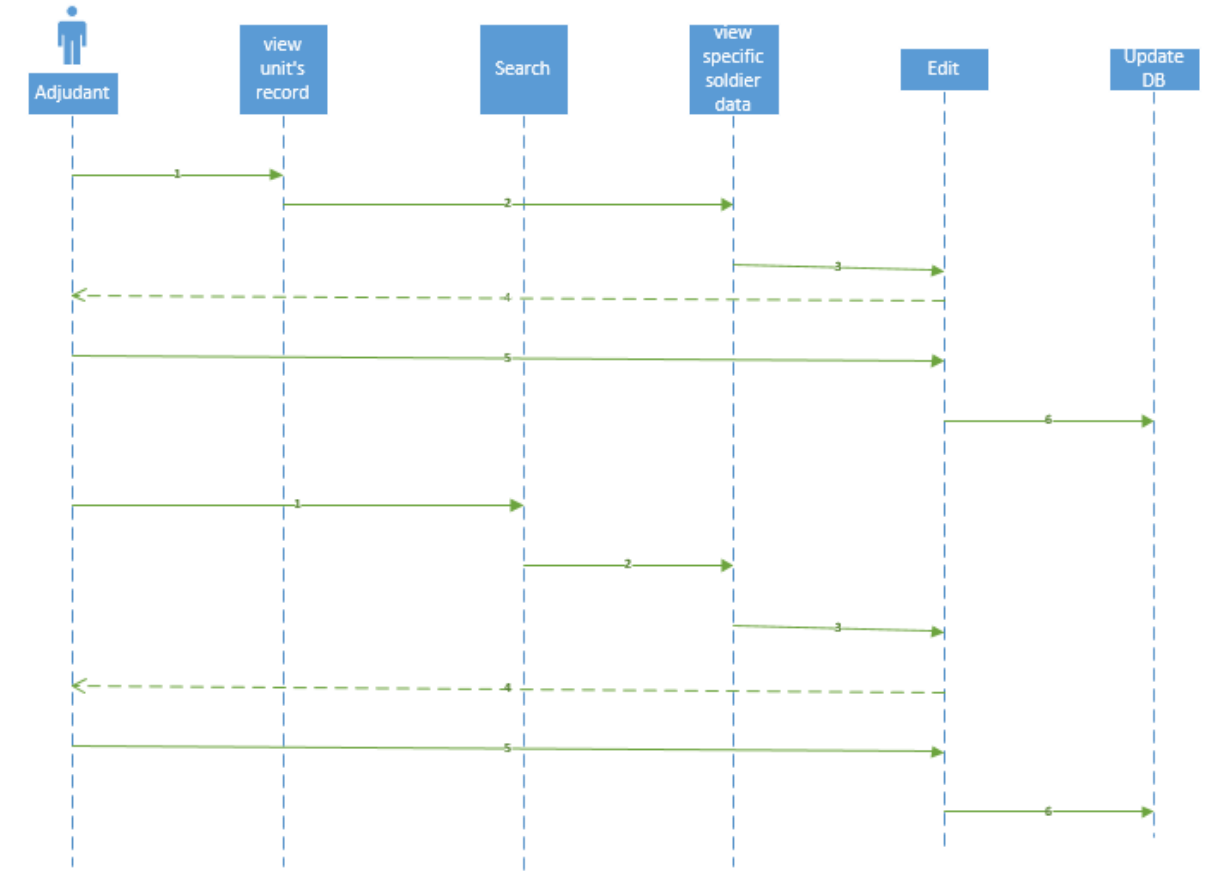
4.3.3.3 ***Adjutant viewing weapon issuance activity status***



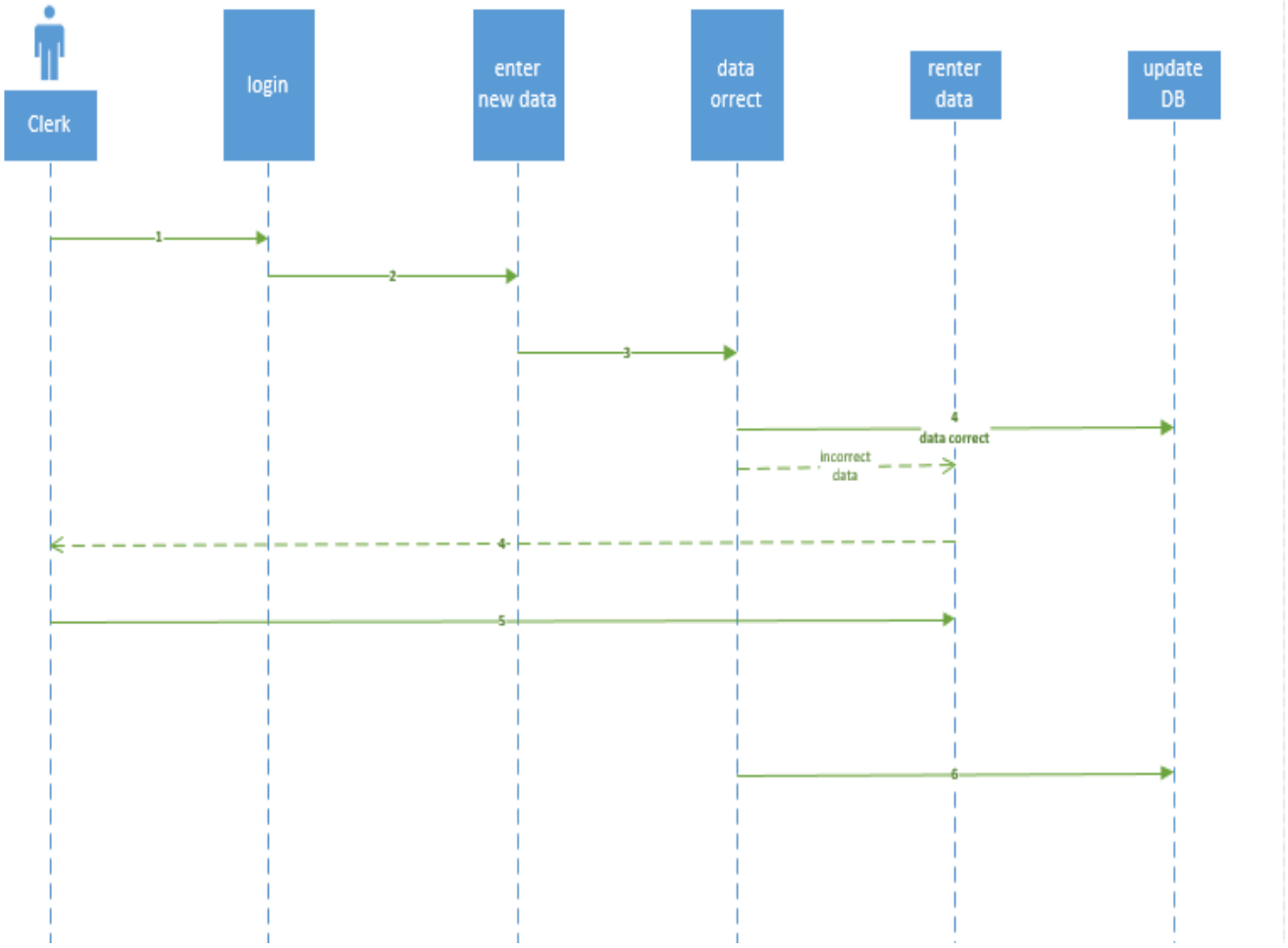
4.3.3.4 ***Adjutant viewing old record of issue:***



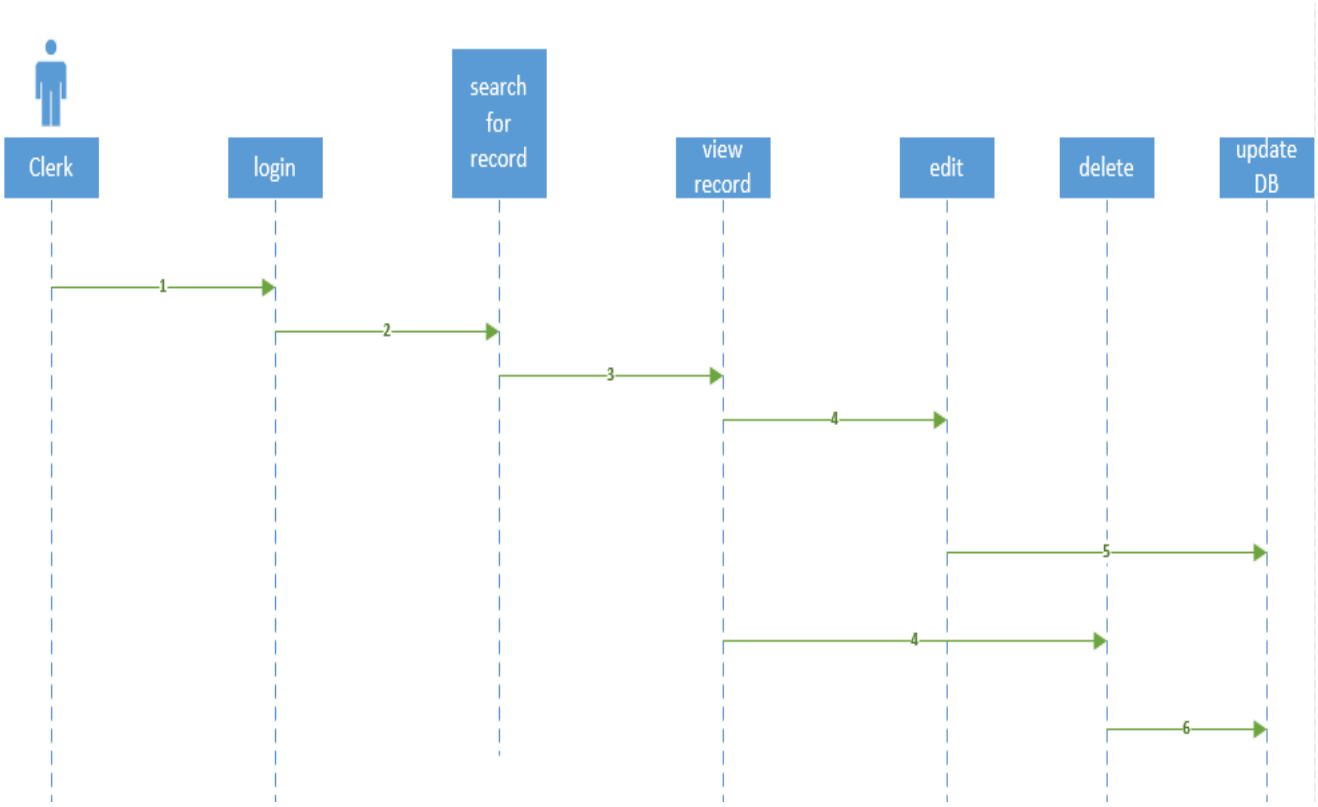
4.3.3.5 ***Adjutant viewing sheetroll***



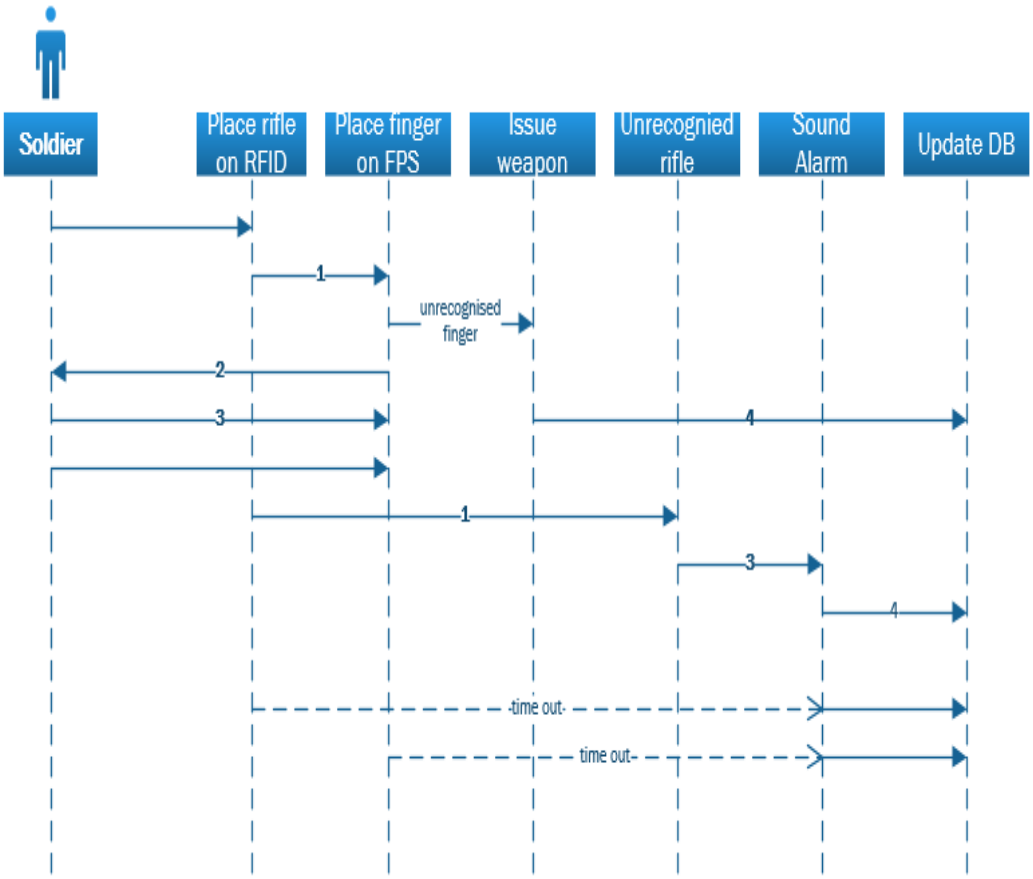
4.3.3.6 ***Clerk adding new soldier sheetroll***



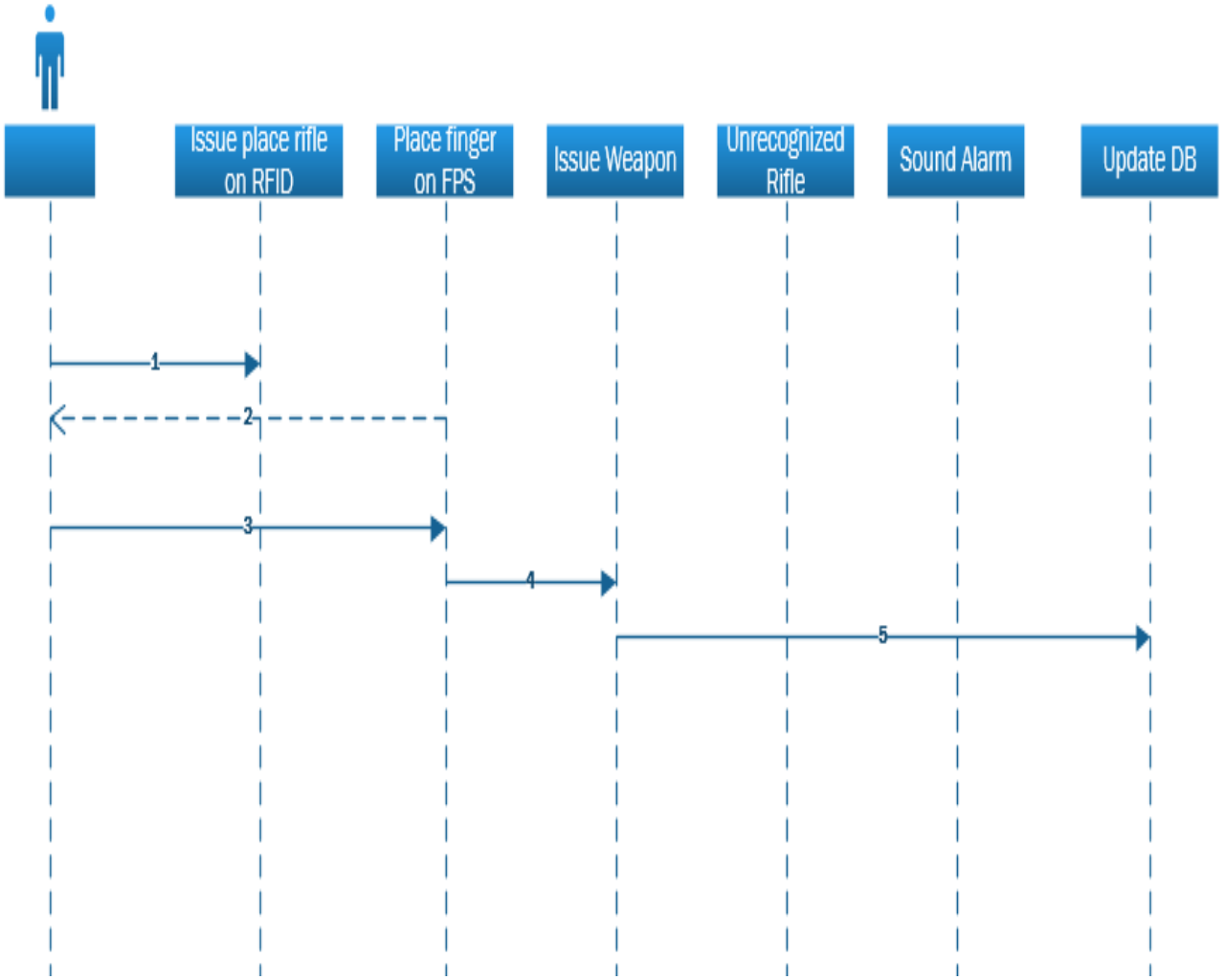
4.3.3.7 ***Clerk editing/deleting soldier sheetroll***



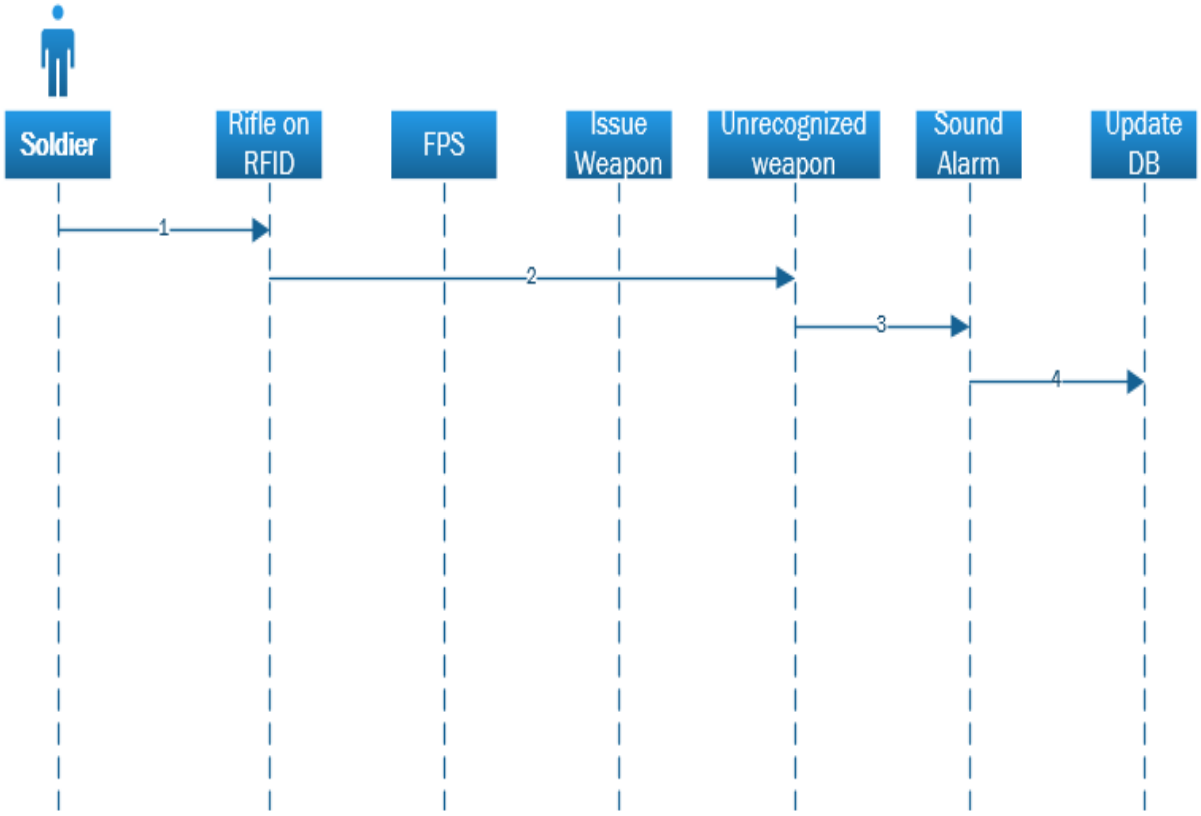
4.3.3.8 ***Soldier getting weapon issued***



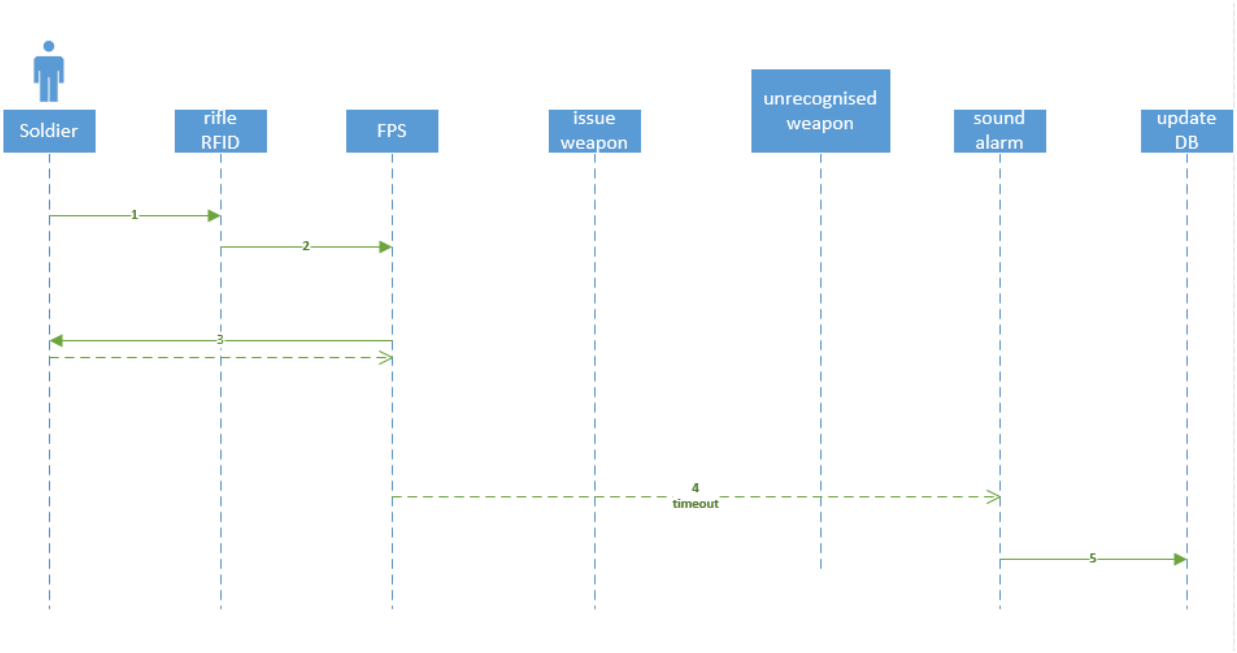
4.3.3.9 ***Normal issue***



4.3.3.10 ***Unrecognized rifle***

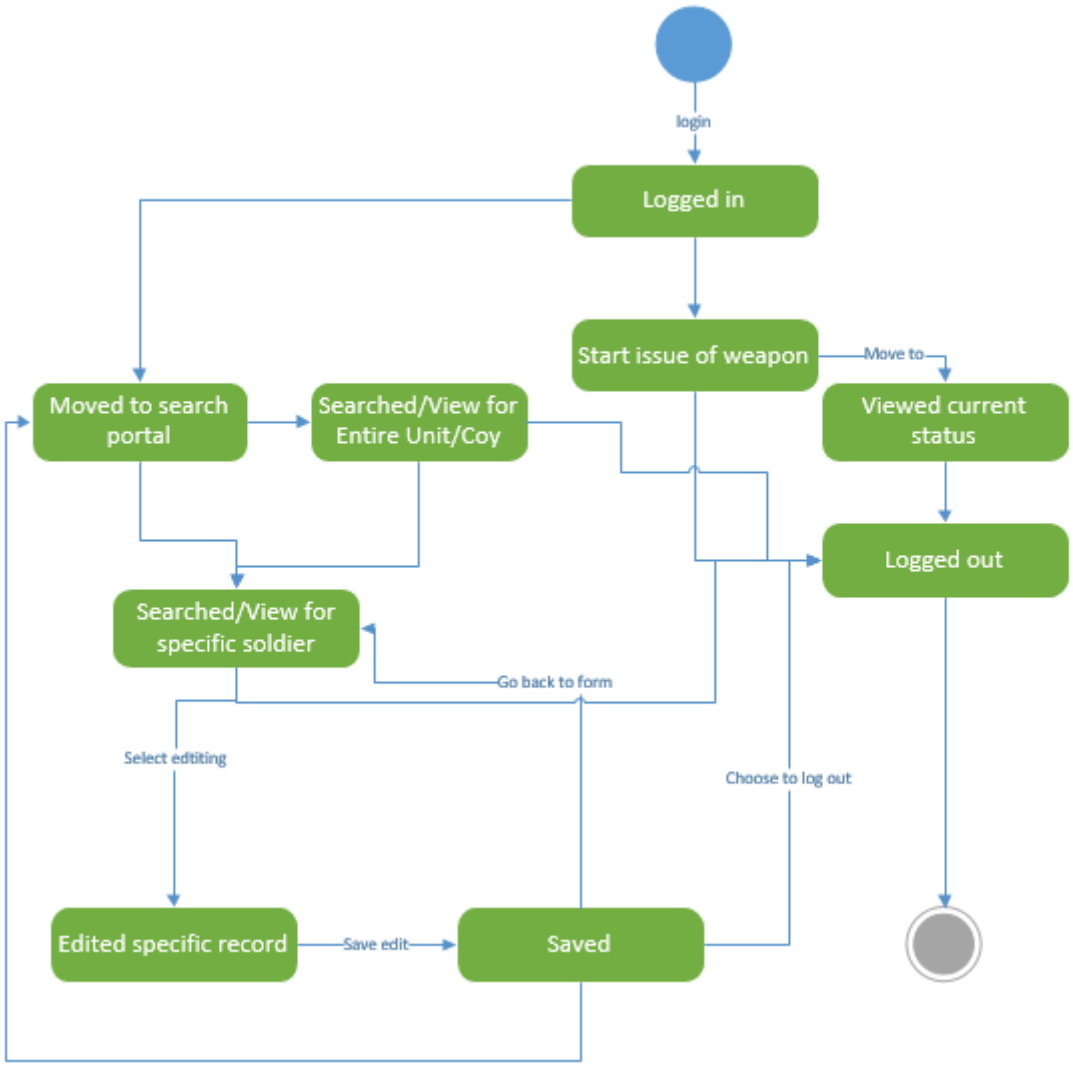


4.3.3.11 ***Unrecognized fingerprint***

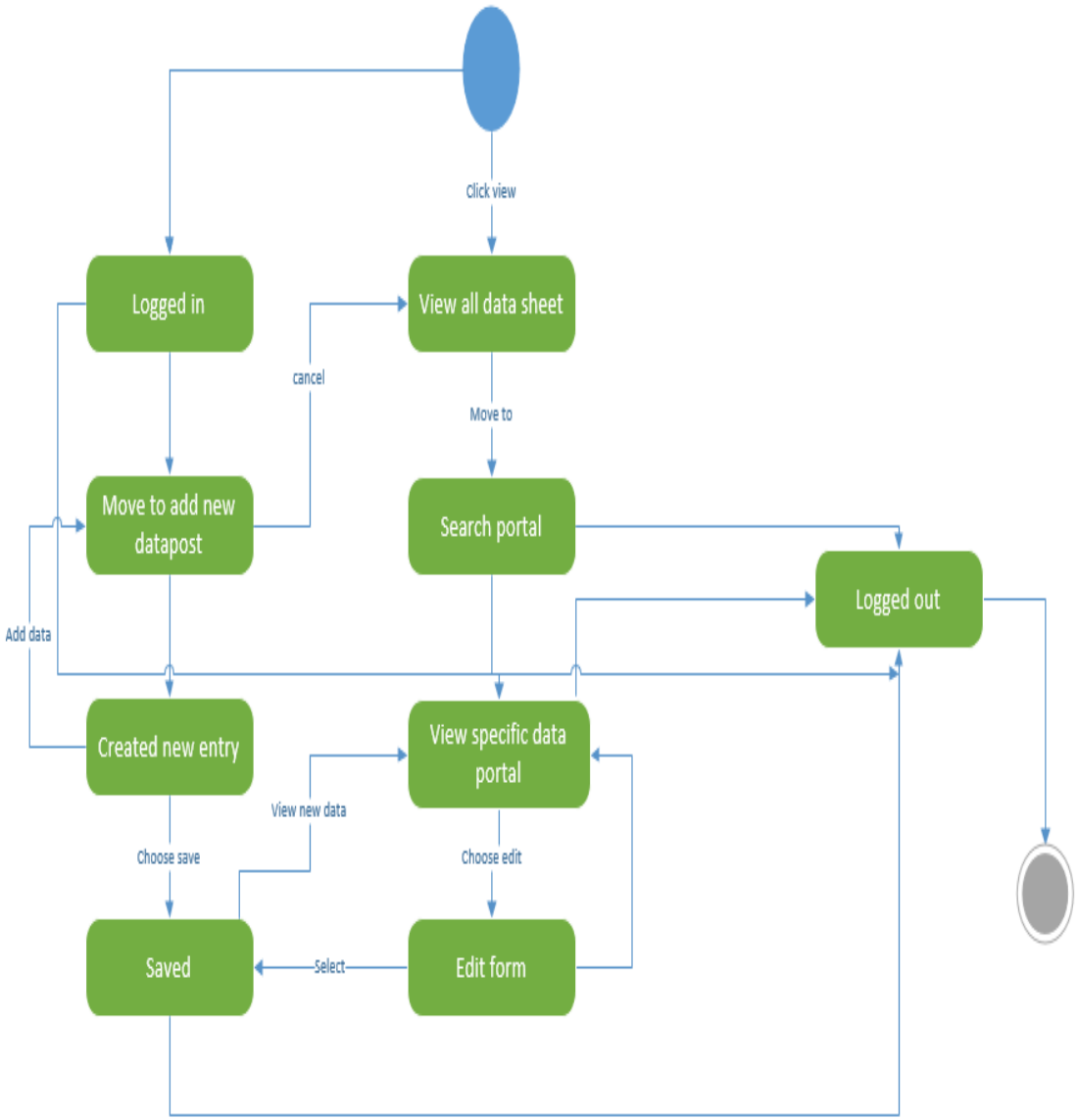


4.3.4 Logical View (State transition Digram):

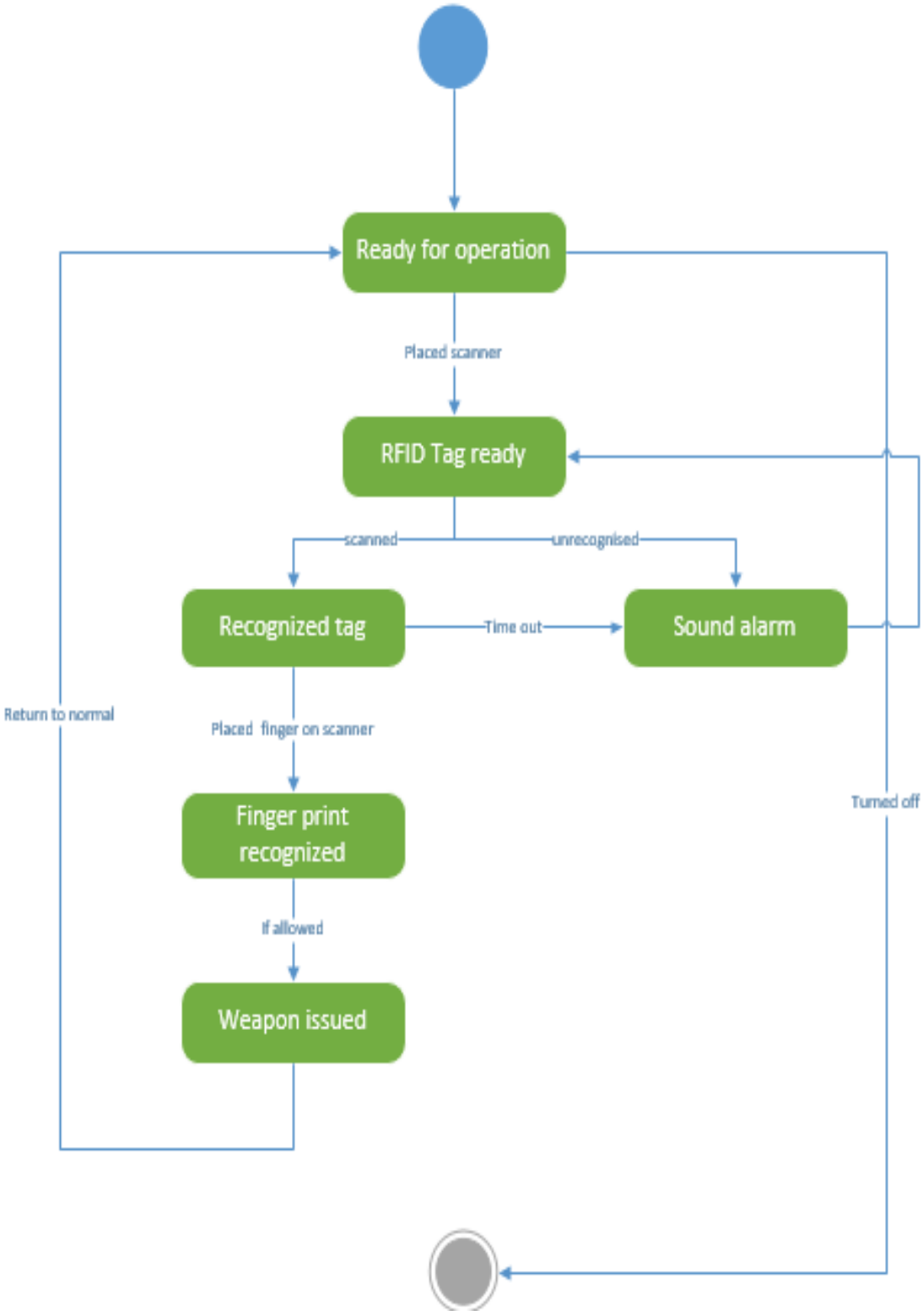
4.3.4.1 State Transition Diagram for Adjutant / company commander Portal)



4.3.4.2 *State Transition Diagram for Adjutant*

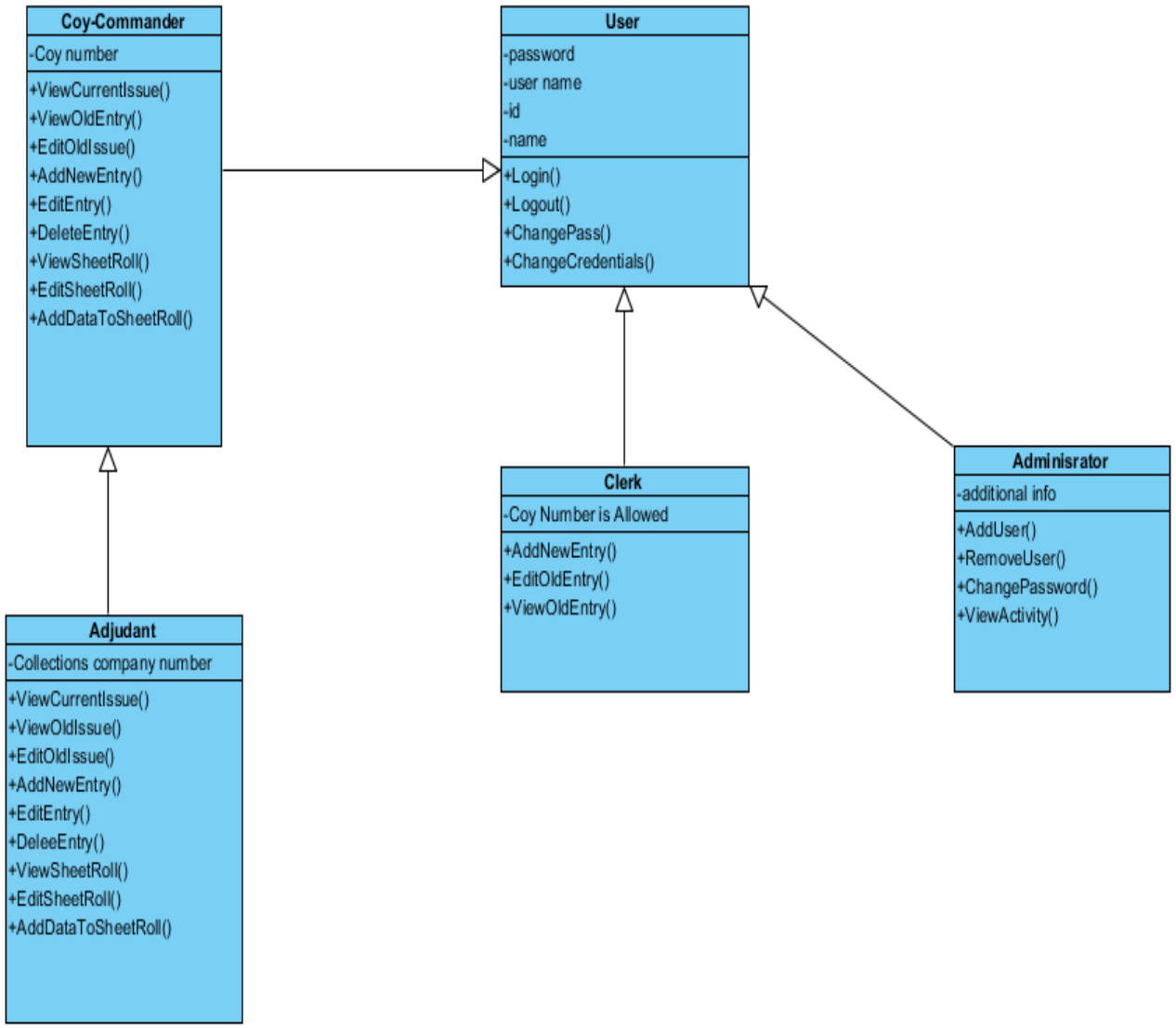


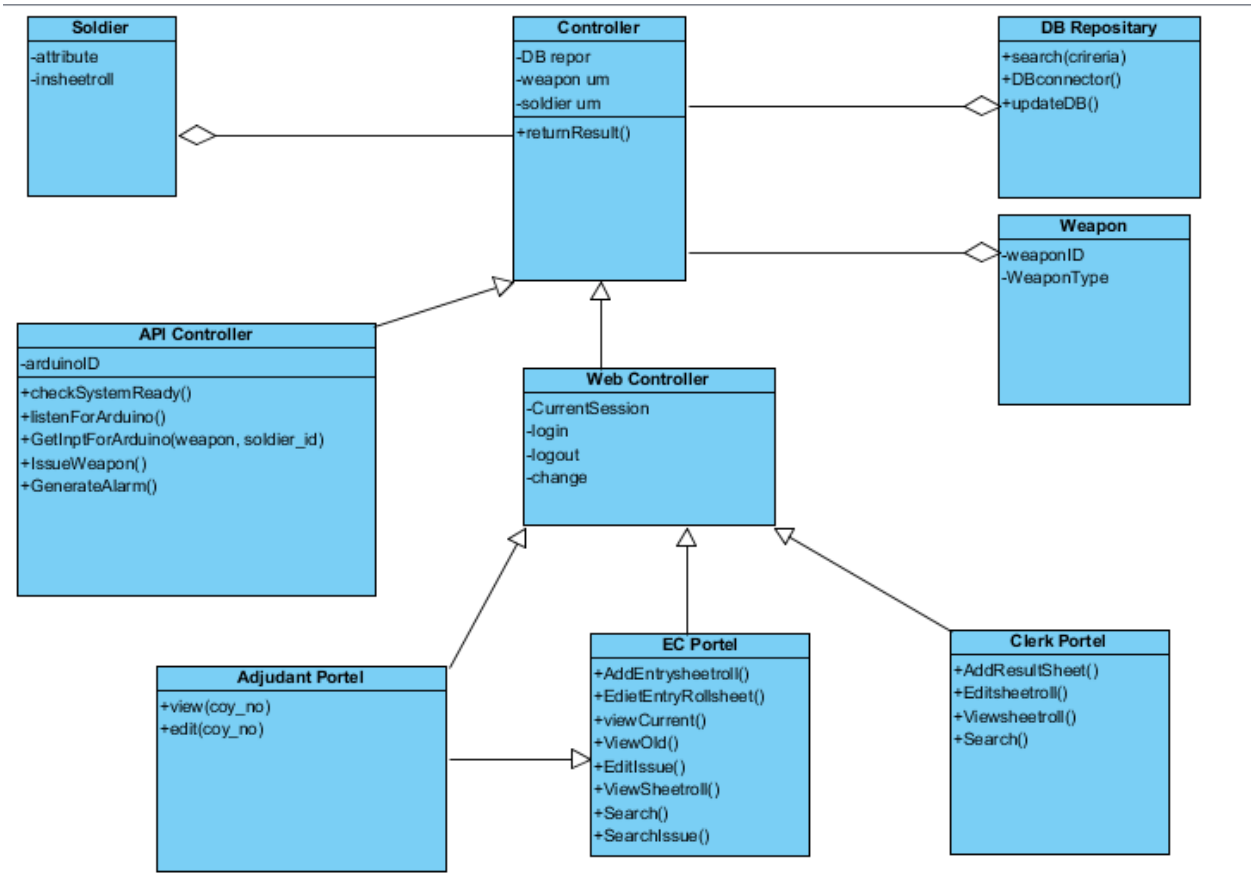
4.3.4.3 *State Transition Diagram for issuing weapon at kote*



4.3.5 Implementation View (Class Diagram)

To accommodate the class diagram into the document, it has to be divided into parts.




Soldier
-attribute
-insheetroll
Controller
-DB repor
-weapon um
-soldier um
+returnResult()
DB Repositary
+search(crireria)
+DBconnector()
+updateDB()
Weapon
-weaponID
-WeaponType
API Controller
-arduinoID
+checkSystemReady()
+listenForArduino()
+GetInptForArduino(weapon, soldier_id)
+IssueWeapon()
+GenerateAlarm()
Web Controller
-CurrentSession
-login
-logout
-change
Adjudant Portel
+view(coy_no)
+edit(coy_no)
EC Portel
+AddEntrysheetroll()
+EdietEntryRollsheet()
+viewCurrent()
+ViewOld()
+EditIssue()
+ViewSheetroll()
+Search()
+SearchIssue()
Clerk Portel
+AddResultSheet()
+Editsheetroll()
+Viewsheetroll()
+Search()

Classes	Description
USER	This class authenticates the user , and allows him to interact with application UI , after the user enters his username and password.
Adjutant	The class that authenticates the Adjutant , behaving as child of USER class. He can now view the weapon issuance activity of his unit and can view sheetroll of any soldier in unit.
Coy Commander	The class that authenticates the Company commander , behaving as child of USER class. He can now view the weapon issuance activity of his company and can view sheetroll of any soldier of his company using this class.
Data cell clerk	This class authenticates the data cell clerk , clerk after authorization do operations on sheetroll of soldiers.
Administrator	Administrator using this class can add and remove users .
Controller	This controls the core functionalities of the application
Soldier	Soldier interacts with this class using his thumb impression on finger print scanner,
Weapon	Soldier issues his weapon by putting his rifle on RFID reader ,which interacts with this weapon class. ID of RFID tag will be the weapon ID.

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4.4 Detailed Description Of Components

4.4.1 Application UI

Identification	*Name:* Application UI *Location:* Presentation layer of the system architecture
Type	UI component
Purpose	The user directly interacts with this component. He/she provides an input for the required action (through this component) and it displays its output respectively. This component fulfills following related to user interaction in the application: **1:** Application should be able to notify invalid username and password if it is not found in database. **2:** If the invalid username or invalid password is entered, application should not load next screen and generate an error message. **3:** If both username and password are valid, application should load next screen. **4:** The application should give the option of logout on different screens so that users can logout of the application at any time.
Function	This component has two major functions; take input from the user and display application screen. It takes input from user in form of keystrokes or other mouse events.
Subordinates	This component has two subordinates; one is responsible for input, the other for output. If fulfills REQ-.5, REQ-7,REQ-8, REQ-9. The input subordinate require user input, it fulfills REQ-.6, REQ-8,REQ-10

	The output subordinate provide output.
Dependencies	It interacts with *Process Data* whenever a user interacts with the application.
Interfaces	All user interfaces defined in section 2.3 are part of it. The user input and output on screens will be shown using these interfaces. It will provide external interface to *Process Data* in form of inputs taken from the user. 1.
Resources	Keyboard and mouse enable user to interact with the application. It will requires a user screen to display the application. The screens will be run by using internal memory i.e.; RAM, Processor of the computer.
Processing	Takes user input in form of keystrokes and other mouse and shapes the output according to user intent.
Data	Entered Values from User, Information String, Name String, Option Selected Integer etc.

4.4.2 Process Control

Identification	*Name:* Process Data *Location:* Application Logic layer of the system architecture
Type	Process control Component
Purpose	Following functional requirements mentioned in SRS are

	fulfilled by this sub-component: **1:** If the Soldiers name or ID does not exist in the database, application should show empty list. **2:** The application should be able to identify blank required fields in SheetRoll. **3:** The application should assign a unique ID to every soldier.. **4:** The system should be able to add or change the information of the soldier .
Function	The function of this sub-component is to manage soldier and weapon data i.e. add, edit, delete, select or show soldier or weapon information or weapon issuance activity.
Subordinates	It has two subordinates, *update data* and *retrieve data*. Update data performs functions like add, delete and edit and satisfy these functional requirements: REQ-6, REQ-7, REQ-8, REQ-10 and REQ-11. Whereas retrieve data will satisfy these requirements: REQ-4, REQ-8, REQ-10 and REQ-11, REQ-13 and REQ-14.
Dependencies	This dependent is dependent on *Data Control* and 'Application UI' .
Interfaces	Soldiers data is fetched from the SQL database (with the help of component 3.5 'Data Control') and displayed onto screen. It provides external interface to component 3.1 'Application UI' in form of data which it gets from the database Whereas it provides external interfaces to component 3.5 'Data Control' Error Messages: 1. No record found. 2. Invalid Entry.
Resources	Hardware: RAM and Processor of the system will be utilized. Software: C# core libraries
Processing	The component handles the organization of soldiers data in the application. It takes input in form of key strokes or other

	mouse events from other components and generate a query according to the user intent.
Data	Information String

4.4.3 Data Control

Identification	*Name:* Data Control *Location:* Database layer of the system architecture
Type	Database component
Purpose	Following functional requirements are fulfilled by this component: **1:** Application should be able to notify invalid username and password if it is not found in database. **2:** If the invalid username or invalid password is entered, application should not load next screen and generate an error message. **3:** If both username and password are valid, application should load next screen. **4:** The system should be able to save or change the information of the soldier.. **5:** The system
Function	This component handles database transactions i.e.; add, update, delete and select statements. It provides a bridge between the application and the database, i.e.; it can take input from the *Process Data* component (refer Section 3.3.1 and 3.3.3) and update the database. Also, it can fetch data from database and send it to the *Process Data*

	component.
Subordinates	It has 2 subordinates; *set* and *get*. *Set* does the modifying part of the database and it will fulfill REQ-10, REQ-11. *Get* does the fetching part from the database and fulfills REQ-3, REQ-5, REQ-6, REQ-7, REQ-8.
Dependencies	It is an independent component, i.e.; it is not dependent on any other component. *Process Data* component depends upon the successful execution of this component. All the functions related to saving, getting and displaying directly or indirectly interacts with this component.
Interfaces	SQL database server in which all the data will be saved. It provides external interface to *Process Data* in form of service of data management this component offers to it.
Resources	**Hardware:** RAM, Processor **Software:** MSSQL, C# core Libraries
Processing	Transaction is performed in order to retrieve data from the database. The component receives a query in form of an input strings from other components The query is then executed and transaction is performed either to retrieve data from database or to update it.
Data	Information string, Authentication bool, SoldierID int etc.

4.5 Reuse and Relationship to other products

WTDMS can be evolved into a bigger and more complex system with more features and functionality. Beginner Kinect developers can also reuse some of the modules of the system. The practical usage of the system can be increased by using long range RFID.

4.6 Design and tradeoffs

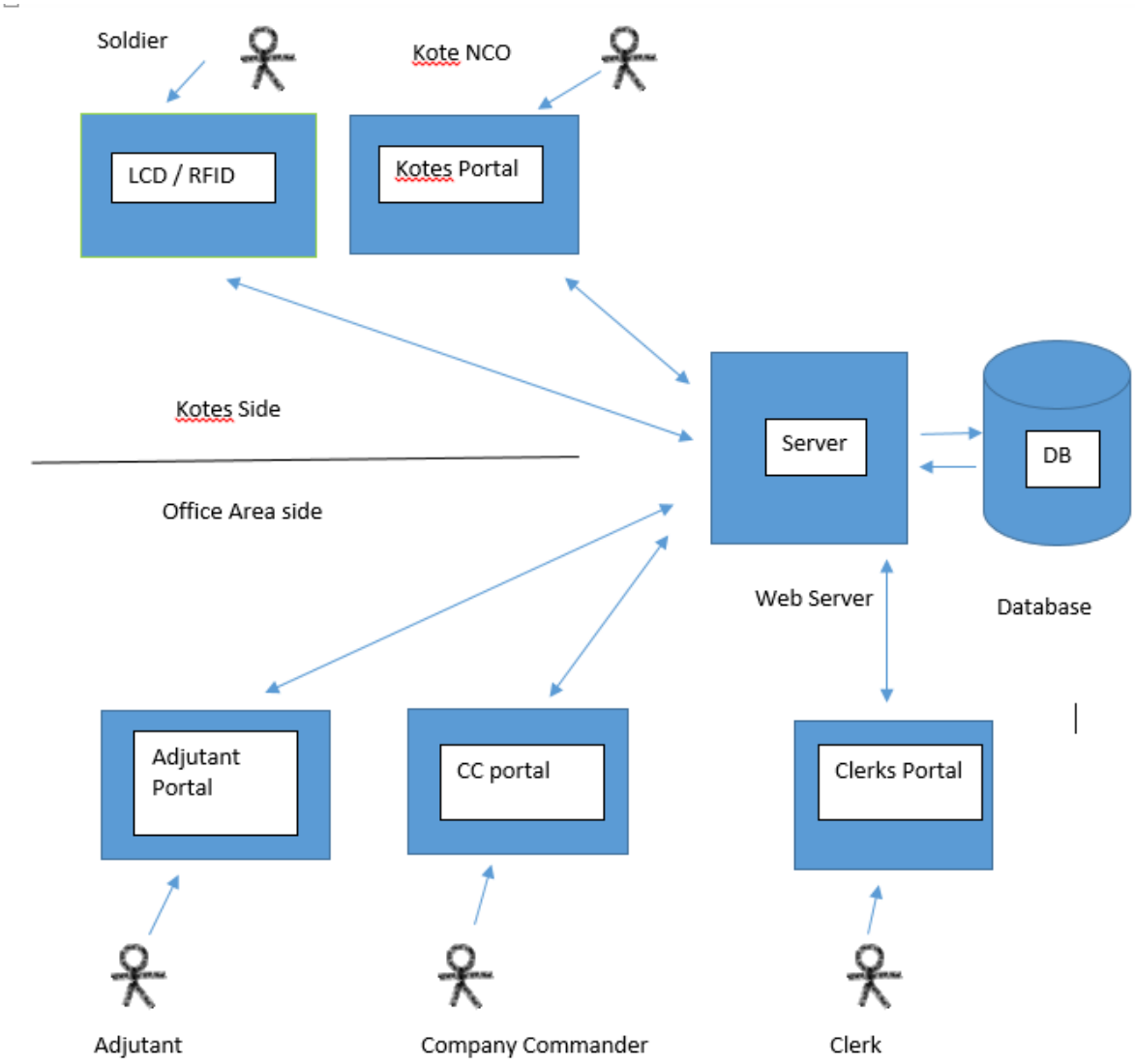

Fig. 5.1:

Presentation layer consists user interfaces of the application, with which the users will be interacting.

Application logic layer *(aka Business Logic)* includes all the algorithms that will be implemented, handles whatever action is done on the presentation layer. It will communicate with and process the information gathered from the presentation and the database layer. It provides a communication channel between both these layers and also

controls the data flow between them. It also controls the information that is to be displayed and the data that is to be stored.

Database layer is only responsible for storing the processed information into the database. It can contain multiple databases in which data is stored in form of tables. It returns some result to the application logic layer upon request. Microsoft SQL Server 2013 will be used for this purpose.

CHAPTER:5

SYSTEM IMPLEMENTATION

5 Pseudo code For components

5.1 For Application UI

```
if Login is Successful
begin
        Show WELCOME MESSAGE
        Show START WEAPON ISSUANCE
        Show SHEETROLL
        Show SWITCH TO ADMINISTRATOR
end
else
    print 'Invalid Username/Password'
```

5.2 FOR PROCESS CONTROL

```
begin
    If input is SET from UI
        get input from UI
        process input
        forward to Data Control'
    If input is GET  from UI
        get input from UI
```

```
        process input

        forward to Data Control

        retrieve results from Data Control

        forward results to UI

end
```

5.3 For Data control

```
begin

    if user_requests_data

        execute user_query and return data

    if user_update_data

        execute user_query and store data into database

end
```

CHAPTER:6

ANALYSIS AND EVALUATION

6 Analysis and Evaluation

6.1 Introduction:

The purpose of this document is to provide all information that is important to plan and control the test effort for the development of this project. It covers the test plan for WTDMS during its development and provides rationale behind necessity of these tests. This document provides an outline of the tests that were implemented, the items were targeted by the tests along with the testing approach that was used.

6.2 Test Items:

- Sign In
- Add sheetroll data
- View sheetroll data
- Edit sheetroll data
- Delete sheetroll data
- Unrecognized soldier
- Soldier Fails to respond in time.
- Enroll New Finger ID

6.3 Features not to be tested:

Following tests will not be done on the system since they are out of the scope of this project. a. Security Testing

6.4 Approach:

Our project is in modules so we will initiate the testing phase by testing each module separately i.e. unit testing and then step by step integrating modules to test them with each other i.e. integration testing and then the complete application is tested as a whole.

6.5 Item Pass/Fail Criteria:

Items will pass the test if the output of each of the test case is same as it was mentioned in SRS document.

6.6 Test Deliverables:

Test Plan Document

6.7 Testing Tasks:

- Develop test cases
- Execute tests based on the developed test cases of the system
- Incorporate or manage changes later in the stage of the project development

6.8 Environmental Needs:

Hardware requirements:

- Desktop/Laptop
- Arduino
- RFID

6.9 Unit Testing

It involves the testing of each module at completion.

Test Case Name:	Application Login Feature testing
Test Case ID:	1
Description:	This feature asks the user to enter his/her credentials for login. If not already signed up, user can sign up. This test case aimed to check that feature works according to user requirement
Testing technique used:	Black Box Testing
Preconditions:	System is running and connected to database.
Input values:	Username String Password string
Valid Inputs:	Valid or authorized username Valid or authorized password
Steps	1. Enter Email 2. Enter password 3. Tap SIGN IN button

Expected Output	The user credentials will be passed to the server for verification. The valid users will be directed to home screen after login.
Actual Output	Successful login. User is directed to home screen.
Status	PASS

Test Case Name:	ADD Sheetroll data (soldiers record)
Test Case ID:	2
Description:	This feature allows the user to add sheetroll data of any soldier.
Testing technique used:	Black Box Testing
Preconditions:	System is running and connected to database.
Valid Inputs:	Button click

Steps	Enter details of soldier in respective entries
Expected Output	Soldiers data is stored in the database.
Actual Output	Soldiers data is stored in the database.
Status	Sheet roll added

Test Case Name:	View sheetroll data

Test Case ID:	3
Description:	This feature lets the user to view sheetroll data of any soldier in the database.
Testing technique used:	Black Box Testing

Preconditions:	System is running, user is logged in and connected to database.
Input values:	Button click
Steps	Click on any entry to view it complete details
Expected Output	All details will be available on right side of web page
Actual Output	User data is stored in the database.
Status	PASS

Test Case Name:	Delete a sheetroll data

Test Case ID:	4
Description:	This feature lets the user to delete data of any soldiers in case he gets posted out of unit

Testing technique used:	Black Box Testing
Preconditions:	System is running, user is logged in and connected to database.
Input values:	Button click
Steps	1. Select a soldier 2. Press delete button
Expected Output	Data is deleted from database
Status	PASS

Test Case Name:	Issuing weapon to a soldier
Test Case ID:	5
Description:	The soldier will use our system to issue a weapon, He will place the gun on the RFID reader and place his finger on the Finger Print scanner.
Testing technique used:	Black Box Testing

Preconditions:	System is running, Soldier's finger print is recognized by the system.
Input values:	RFID tag (Gun Number), Finger Print ID
Valid Inputs:	HEX, Numeric
Steps	1. Place RFID tag(Gun) on reader 2. Place Finger on Finger Print scanner. 3. Wait for system to authenticate. 4. Take weapon.
Expected Output	Weapon is issued.
Actual Output	The weapon is used, portals are updated and data is logged.
Status	PASS

Test Case Name:	Unrecognized Soldier
Test Case ID:	6
Description:	A case where our system does not recognize, the user's finger print is not logged in the database.
Testing technique used:	Black Box Testing
Preconditions:	System is running and connected to database.
Input values:	RFID Tag, Finger ID
Valid Inputs:	Valid parameters
Steps	1. Place RFID tag on scanner 2. Place Finger on scanner 3. Wait for system to authenticate. 4. Check for error.
Expected Output	An Error is generated on the arduino, The LCD will display "user not found"

Actual Output	Arduino “LCD displays user not found”
Status	PASS

Test Case Name:	Soldier Fails to respond in time.
Test Case ID:	7
Description:	The user does not respond to the Arduino Terminal within 20 seconds , The arduino portal will reset itself to normal state.
Testing technique used:	Black Box Testing
Preconditions:	System is running and connected to database.

Input values:	RFID, Finger ID	

Valid Inputs:	Recognized RFID, Finger ID	
Steps	1. 2.	Place RFID on scanner wait for timeout
	3.	Observe condition
Expected Output	Error is generated on Arduino LCD screen, arduino resets itself to initial state	
Actual Output	Timeout occurs , error is generated.	
Status	PASS	

Test Case Name:	Enroll New Finger ID
Test Case ID:	8
Description:	This feature allows the admin to enroll a new soldier into the system, An solider can only be enrolled if the admin authenticates from his portal
Testing technique used:	Black Box Testing

Preconditions:	System is running, admin is logged in
Input values:	FingerID, button Click
Valid Inputs:	Valid fingerID
Steps	1. Press enroll button on Arduino 2. Admin will authenticate Enrollment 3. Solider will place finger on scanner. 4. A new entry will be made in the database for that fingerId
Expected Output	The soldier will be enrolled in our system and will be given a finger ID by our system.
Actual Output	The soldier is enrolled and a fingerID is generated.
Status	PASS

CHAPTER:7

FUTURE WORK

7 FUTURE WORK

A system of this magnitude always needs more and more work to evolve. There are a lot of possible changes and additions that can be done to the system to improve its performance and functionalities. The system has been made in a modular fashion which enables integrating new features very easy.

Some of the key features which current version doesn't have are:Long Range RFID. These functions can be added over the time to increase further usability of the system and provide better results with more proficiency.

CHAPTER:8

CONCLUSION

8 CONCLUSION

8.1 Overview

The main purpose of this project is the development of a system that would allow:

1. Soldier to issue their authorized weapon only
2. Authorities to view data of soldier of concerned company or unit.

8.2 Objectives Achieved

The Project developed to achieve the objectives of learning software development process/cycle, thalintegration of databases. It also helped us understand what are the problems we need to face when developing a project in the industry.

CHAPTER:9

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9 BIBLIOGRAPHY

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6. https://github.com/hapijs/hapi

APPENDIX A

USER MANUAL

1.0 General Information

10 GENERAL INFORMATION

This section explains in general terms the Weapon and Troops Data management system and the purpose for which it is intended.

10.1 System Overview:

Weapon and Troops Data management system is a system that allows soldiers to issue their own weapon only by placing their thumb on finger print scanner and the their rifle on RFID reader to ensure authorized issuance of weapon. It also allows officers in a unit to view data of soldiers which can be edited or deleted by data cell clerk.

10.2 Organization of the manual:

The user's manual consists of five sections: General Information, System Summary, Getting Started, Using The System..

1. **General Information** section explains in general terms the system and the purpose for which it is intended.
2. **System Summary** section provides a general overview of the system. The summary outlines the uses of the system's hardware and software requirements, system's configuration, user access levels and system's behavior in case of any contingencies.
3. **Getting Started** section explains how to setup the system and configure it for the first time. The section presents briefly system's settings.
4. **Using the System** section provides a detailed description of system functions.

2.0 System Summary

11 SYSTEM SUMMARY

System Summary section provides a general overview of the system. The summary outlines the uses of the system's hardware and software requirements, system's configuration, user access levels and system's behavior in case of any contingencies.

11.1 System Configuration:

Weapon and Troops Data management system requires NodeJs and Arduino setup to be installed on the operating system. Minimum version of NodeJs required is version 6, System also needs to be connecting to Arduino Lcd , finger print scanner and RFID reader.

11.2 User Access Levels:

The System will be available for to Adjutant , Company commander , Kotes NCO and data cell clerk.

11.3 Contingencies:

In case of any errors or system crashes, the database will not be affected .During issuance of weapons if soldier doesn't put his thumb on RFID tag properly , system has a timeout period of 10 seconds .

3.0 Getting Started

12 GETTING STARTED

Getting Started section explains how to configure the system and install it for the first time use. The section also presents briefly the system's menu.

12.1 Installation:

The application can be installed by the by running all the files prepared for the project in Notepad

1. It should be connected to the network
2. RFID reader and finger print scanner should be properly configured.

12.2 System Menu:

The main menu screen of the application will provide the user four options.

1. ***View Sheetroll*** will allow the user to start a new viewing soldiers data.
2. The **View weapon issuance activity** button shows how many weapons have been issued.
3. The ***view previous weapon issuance activity*** button will display previous weapon issuance activities .
4. ***Start issuing weapon*** button is only available at kotes portal, clicking this button will ask the permission from the company commander to start issuance of weapons.
5. The ***Logout*** button will close the system .

12.1 View sheetroll:

Pressing the view sheetroll button will open a new page where officer can search data of any soldier by his name or army number, he can also edit or delete data.

12.2 View weapon issuance activity:

Pressing the **View weapon issuance activity** button on the main menu will display the status of weapon issuance at the kote area.

12.3 View Previous weapon issuance activity:

Pressing the **View Previous weapon issuance activity** button on the main menu will display the record of firing days and the status of the weapons issued on that date

12.4 Start issuing weapon:

Kote commander has to get approval of respective officer to start issuance of weapon after clicking this button.

12.5 Log Out

Clicking this button will close the application.