CHAPTER FOUR

SYSTEM DESIGN SPECIFICATION

4.0 Introduction

A System Design Specification is a document that details all the aspects that shall be input in the system. It describes and shows all data, architectural, interface and component-level design for the software. This chapter shall show the architecture of the proposed Courier Management System. The design contains an explanation of a way to carry out each of the product specification written in the Software requirement specification (SRS). The design will serve as a guide to the developer. The SDS also shows how the program is separated into modules, how the modules interact with each other and how users see the program.

4.1 Objective

The objective of this document is to be a reference for the implementers of the proposed system. The document describes each application's architecture and its associated interfaces and databases design. This design will detail the implementation of the requirements as defined in the CMS specification design.

4.2 System scope

Due to this, there exists an urgent need to shift the mode of manual operations to Automated operations to a more efficient and reliable system which shall overall improve customer experience and the performance of the business.

- Development of an online Courier Management System that shall handle the courier services within the Logistics Department**.**
- Setting up the system on the main server ready for deployment.
- Training the users on how to use the new system.
- Request for an Administrator who shall configure the new Courier Management System.

4.2.1 Main Inputs:

(a) Booking Officer

(b) DriverID

(c) Sender Name, telephone number

(d) Destination

(e) Recipient Name

(f) Date send

(g) Date collected

(h) Amount paid

4.2.2 Outputs:

(a) Enter parcel details

(b) Add new user

(c) Add new driver

(d) Courier client login

(e) Track parcel

4.3 Design Considerations and Constraints

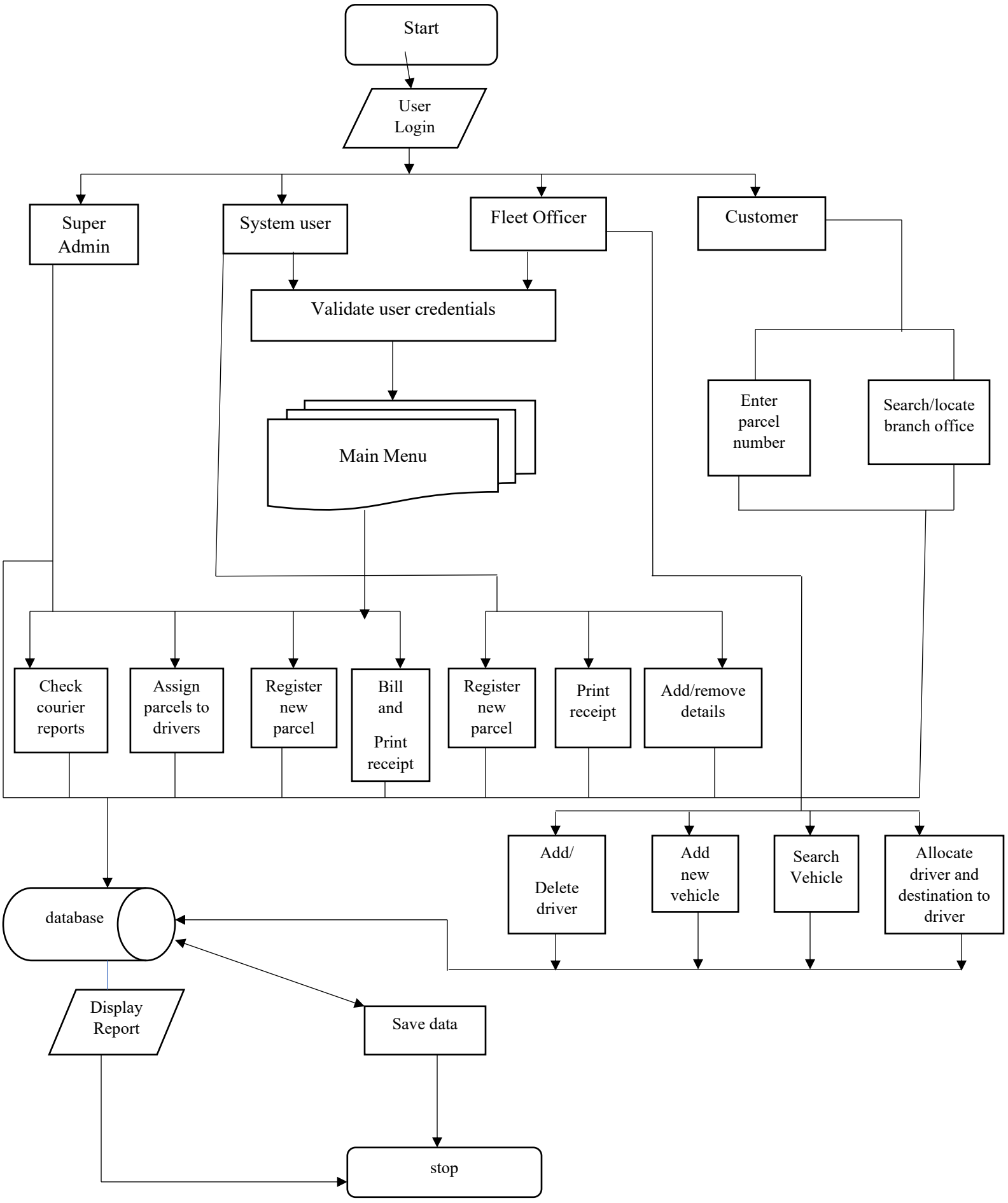
- The client will be operating on Windows platform with a network connection to the respective branch offices**.**
- The expected number of users is 200 Personnel.
- The system will require memory of at least 1GB of RAM, Processing speeds of 1.4GHz and 1TB of available hard disk space.

4.4 Goals and Guidelines

- **Simplicity:** apply the KISS principle. Simplicity should be a key goal when designing and avoid unnecessary complexities.
- Emphasis on speed versus memory use.
- Working, looking or feeling like an existing product-innovate rather than invent a product.

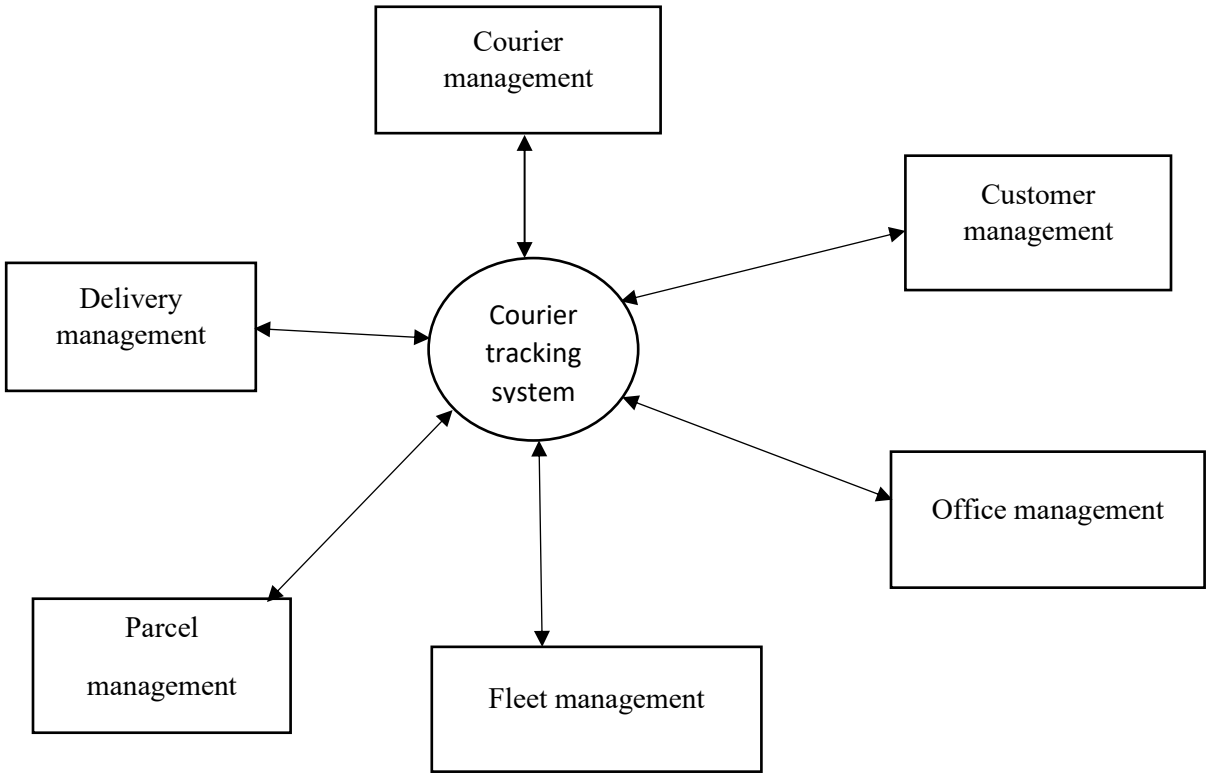
4.5 Architectural Design:

Architectural design entails definitions of components and the inter-relationships that exist between them. It also shows the design components involved, major subsystems within the application and the interactions illustrated below:


Start
User Login
Super Admin
System user
Fleet Officer
Customer
Validate user credentials
Main Menu
Enter parcel number
Search/locate branch office
Check courier reports
Assign parcels to drivers
Register new parcel
Bill and Print receipt
Register new parcel
Print receipt
Add/remove details
Add/ Delete driver
Add new vehicle
Search Vehicle
Allocate driver and destination to driver
database
Display Report
Save data
stop

4.5.1 CONTEXT DIAGRAM

A context diagram shows the information inflow and outflow in the system. The context diagram captures the detailed operations of the Courier Management system

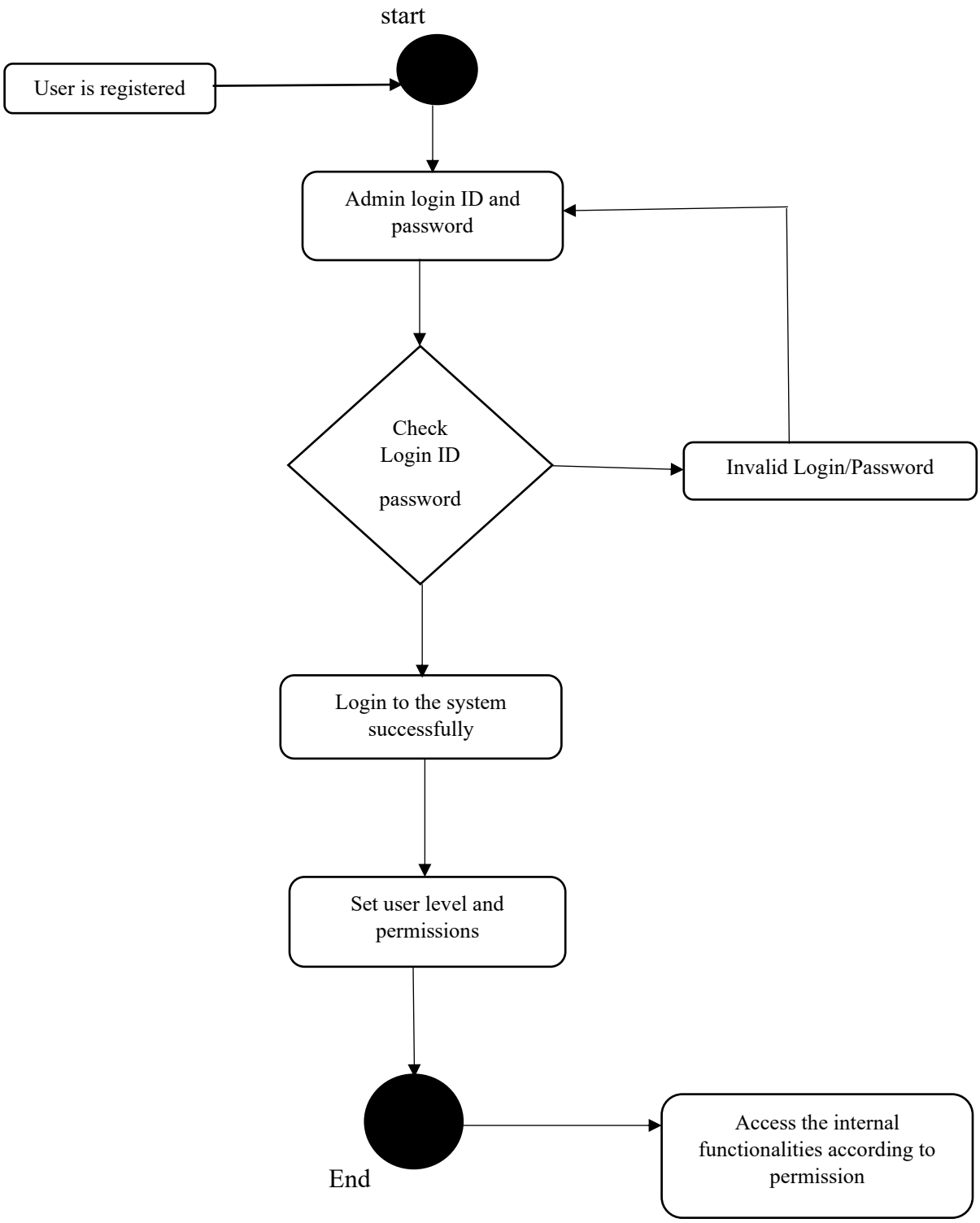


This is at-a-glance view of the Delivery, office and Tracking showing the system as a single high-level process with its relationship to external entities of courier, customer and manager.

4.6 LOGICAL DESIGN

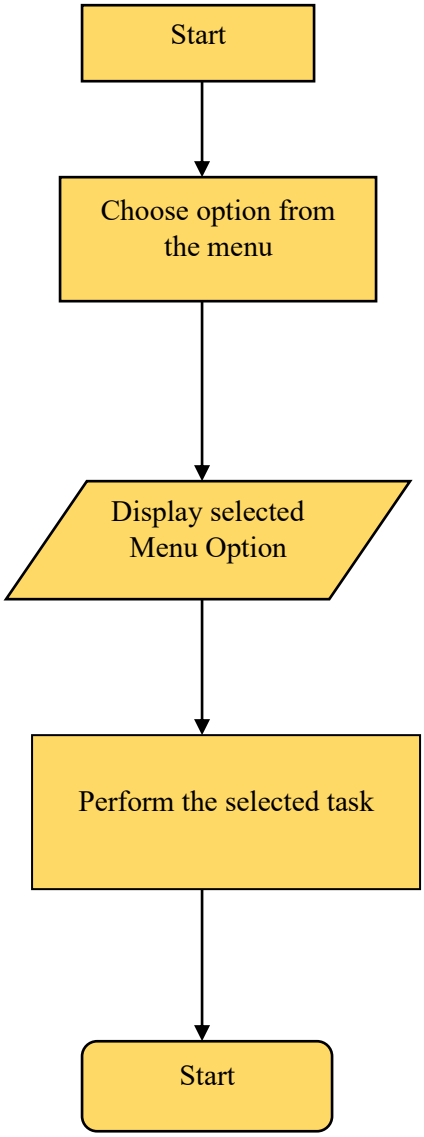
i) Login Flowchart

This is a graphical step by step representation of how a user logs into the system.

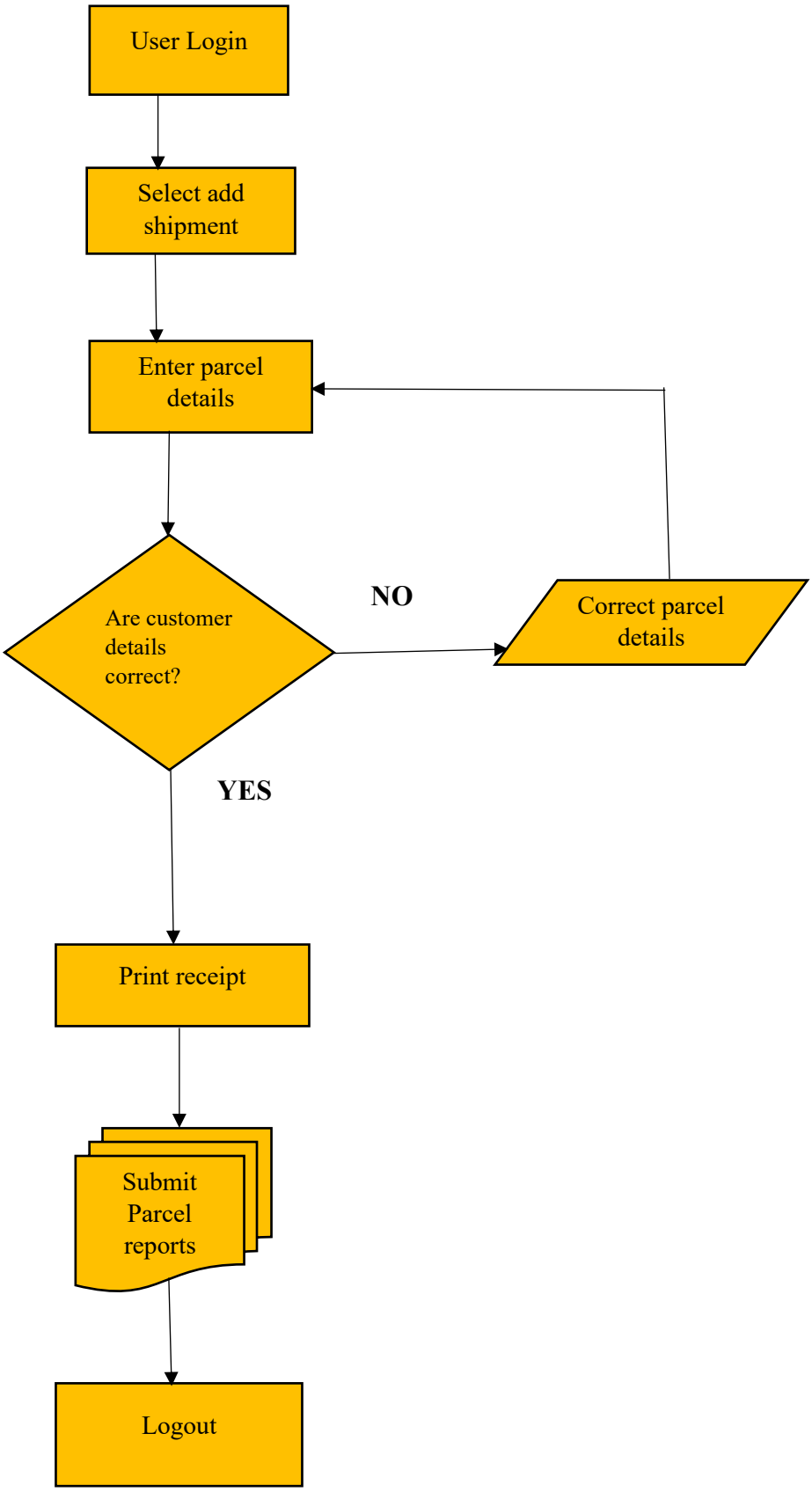


ii) Multiple Document Interface/Main Menu Flowchart

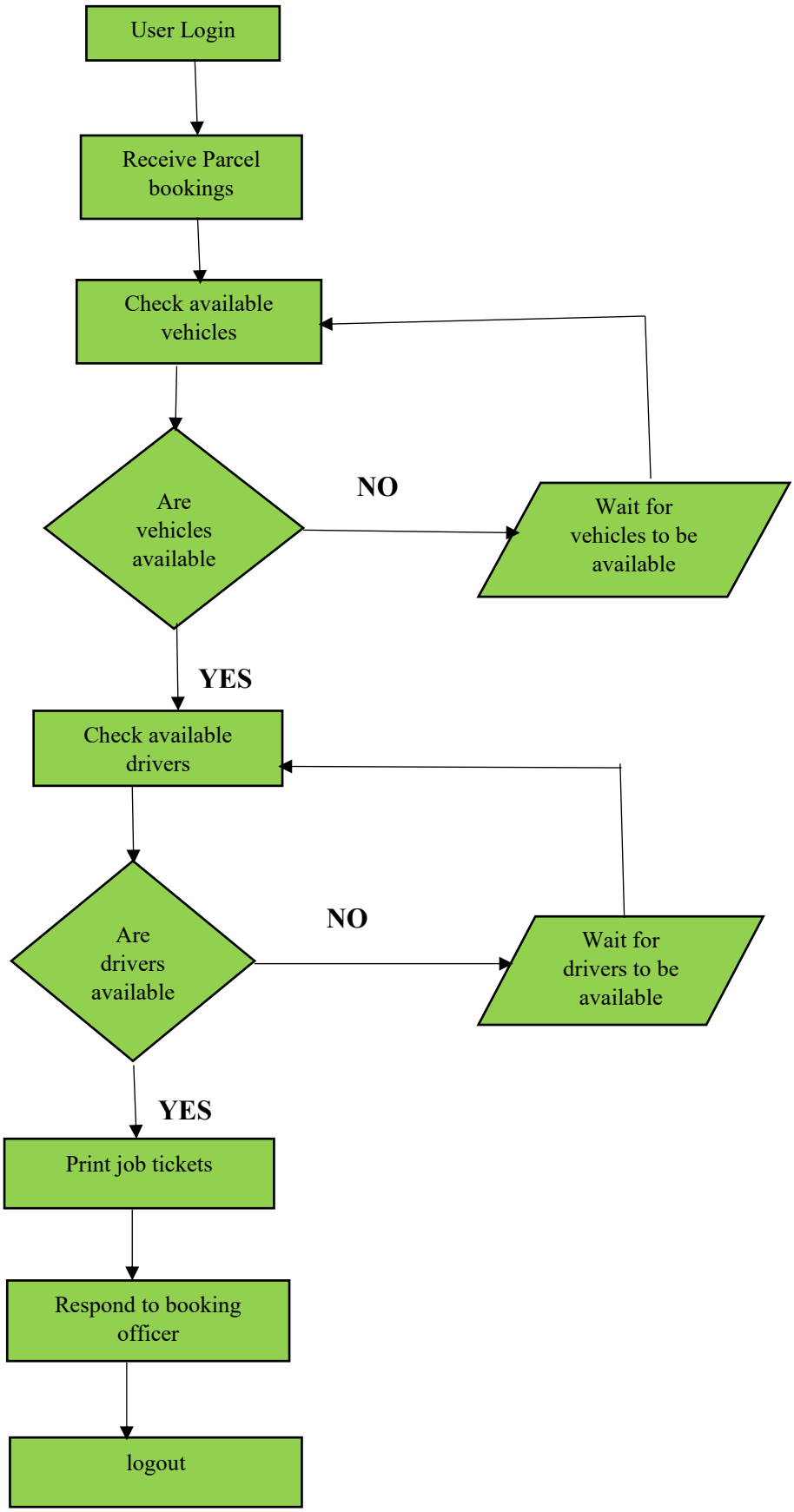
This shows the graphical step by step representation of how a user navigates in the main menu.



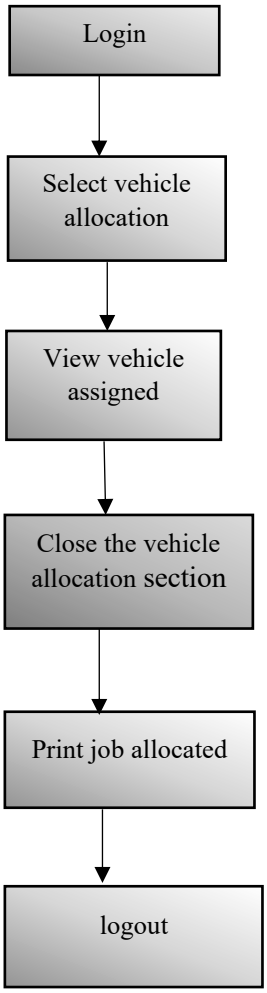
iii) Parcel Booking Flow Chart



iv) Allocation of Vehicle and Driver Flow Chart



v) Check allocated jobs Flow Chart



4.7 Database Modelling

A data model identifies things of importance to an organization, properties of that organization and how the organization is related to one another. The model provides accurate pictures of the information needs of the organization. The techniques used in data modeling are:

- Data Normalization
- Data Dictionary

4.7.1 Data Normalization

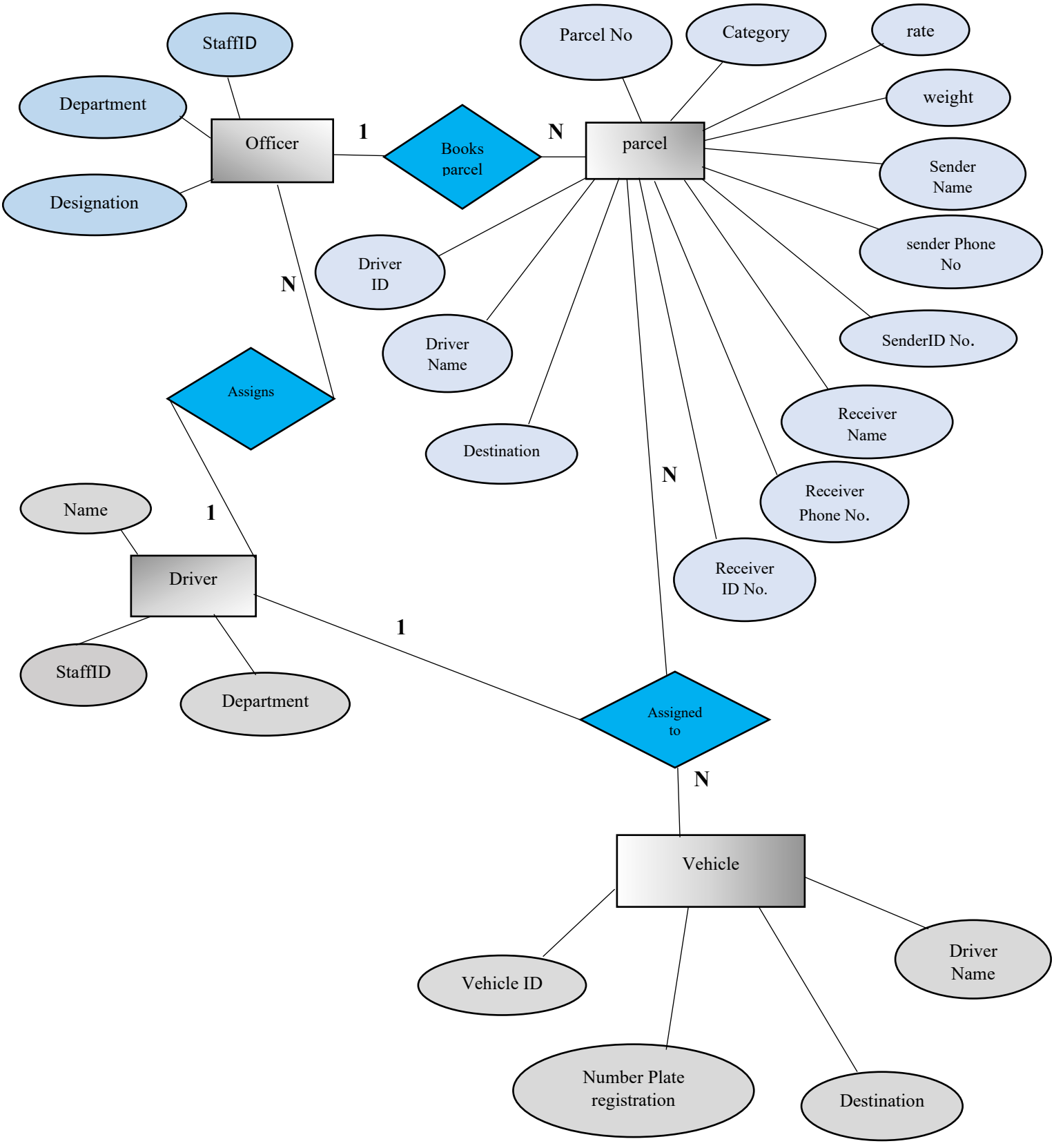
It is a technique of organizing the data in the database. Normalization is a systematic approach of decomposing tables to eliminate data redundancy and undesirable characteristics like Insertion, Update and Deletion Anomalies. It's a multi-step process that puts data into tabular from by removing duplicated data from the relation tables.

UNF	1NF	2NF	3NF
OFFICER	**OFFICER**	**OFFICER**	**OFFICER**
Name	Name	Staff ID	Staff ID
ID Number	ID Number	Department	Department
Staff ID	Staff ID	Designation	Designation
Department	Department	Date of Employment	**DRIVER**
Designation	Designation	**DRIVER**	Name
Telephone No.	Telephone No.	Name	Staff ID
Address	Date of employment	Staff ID	Department
Date of Birth		Department	**PARCEL**
Date of Employment	**DRIVER**	Designation	Parcel Number
DRIVER	Name	Years of Experience	Category
Name	ID Number	**PARCEL**	Weight
ID Number	Staff ID	Parcel Number	Rate
Staff ID	Department	Category	Sender Name
Department	Designation	Weight	Sender Phone No.
Designation	Telephone No.	Rate	Sender ID No.
License No.	Date of Employment.	Sender Name	Receiver Name
Telephone No.	Years of Experience	Sender Phone No.	Receiver Phone No.
Address	**PARCEL**	Sender ID No.	Receiver ID No.
Date of Birth	Parcel Number	Sender Address	Destination
Date of Employment	Category	Receiver Name	Driver Name
Years of Experience	Weight	Receiver Phone No.	Driver ID

PARCEL	Rate	Receiver ID No.	**VEHICLE**
Parcel Number	Sender Name	Destination	Vehicle ID
Category	Sender Phone No.	Driver Name	Number plate Registration
Weight	Sender ID No.	Driver ID	Destination
Rate	Sender Address		Driver Name
Sender Name	Receiver Name	**VEHICLE**	Driver ID
Sender Phone No.	Receiver Phone No.	Vehicle ID	
Sender ID No.	Receiver ID No.	Number plate Registration	
Sender Address	Destination	Engine No.	
Receiver Name	Driver Name	Destination	
Receiver Phone No.	Driver ID	Driver Name	
Receiver ID No.	**VEHICLE**	Driver ID	
Destination	Vehicle ID		
Driver Name	Number plate Registration		
Driver ID	Engine No.		
VEHICLE	Destination		
Vehicle ID	Driver Name		
Number plate Registration	Driver ID		
Engine No.			
Destination			
Make			
Model			
Driver Name			
Driver ID			

4.7.2 Entity-Relation Diagram

ERD show how the entities identified in this section are mapped into tables of the database for the Courier Management system software.



4.7.3 Database Schema

The database schema below is derived from the Entity-relation diagram above.

Officer Data Entity		
Data Item	**Type**	**Comment**
Staff ID	Integer	Used as Primary Key
Department	String	Select
Designation	Variable Character	
Driver Data Entity		
Data Item	**Type**	**Comment**
Name	string	
Staff ID	Integer	Used as Primary Key
Department	String	
Parcel Data Entity		
Data Item	**Type**	**Comment**
Parcel Number	Number	Used as Primary Key
Category	Text	
Weight	Decimal	
Rate	Float	
Sender Name	Text	
Sender Phone No.	Number	
Sender ID No.	Number	
Receiver Name	Text	
Receiver Phone No.	Number	

Receiver ID. No	Number	
Destination	Text	
Driver Name	Text	
Driver ID	Number	
Vehicle Data Entity		
Data Item	**Type**	**Comment**
Vehicle ID	Integer	
Number Plate Registration	Character	Used as primary key
Destination	Text	
Driver Name	Text	

4.7.4 Data Dictionary

Entity Name	Entity Description	Data Type	Length	Primary Key	Uniqueness	Null
Officer	The staff assigned the roles of booking parcels, assigning vehicles to drivers and allocating jobs to drivers.					
ID	The Unique identification for the officer employment number	Integer	10	Yes	Uniquely identifies the employee	No
Department	The major part of the company an employee works in**.**	String	15	No	Uniquely identifies the officer section	No

Designation	The job title of the employee	Varchar	20	No	Employee job title	No
Driver	The Staff who drives the vehicles and ensures delivery of the parcels and consignment.					
Name	The name of the employee	String	50	No	Uniquely identifies name of the driver	Yes
ID	The Unique identification for the employees	Integer	10	Yes	Uniquely identifies the driver's employment number	No
Department	The major part of the company an employee works in**.**	String	15	No	Uniquely identifies the driver section	No
Parcel	The envelope, box or items to be sent.					
Parcel Number	The unique number generated by the system	varchar	20	Yes	Uniquely identifies the item being sent	No
Category	The type of item being sent e.g. letter or box	String	10	No		
Weight	How heavy the item being sent is.	Decimal	10	No	Uniquely tells how heavy an item is.	No
Rate	The cost of sending the parcel per category	Float	20	No	The cost of sending the parcel	Yes

Sender name	The name of the sender of parcel	String	100	No	Identifies the sender of the parcel	No
Sender Phone No	The telephone number of the sender	Integer	15	No	The unique telephone number of the sender.	No
Sender ID No.	The Identification Number of sender of parcel	Integer	20	No	The unique identification Number of the sender.	No
Receiver Name	The name of the receiver of the parcel.	String	100	No	Identifies the recipient of the parcel	No
Receiver Phone No	The telephone number of the recipient.	Integer	15	No	The unique telephone number of the Recipient.	No
Receiver ID No.	The Identification Number of Recipient of parcel.	Integer	20	No	The unique identification Number of the Recipient.	No
Destination	The place where the parcel is being sent.	String	20	No	The unique name of the place where the parcel is being sent.	Yes
Driver Name	The name of the driver	String	50	No	The name of the driver	Yes
Staff ID	The Unique identification for the officer employment number	Integer	10	No	The Unique identification for the officer	No

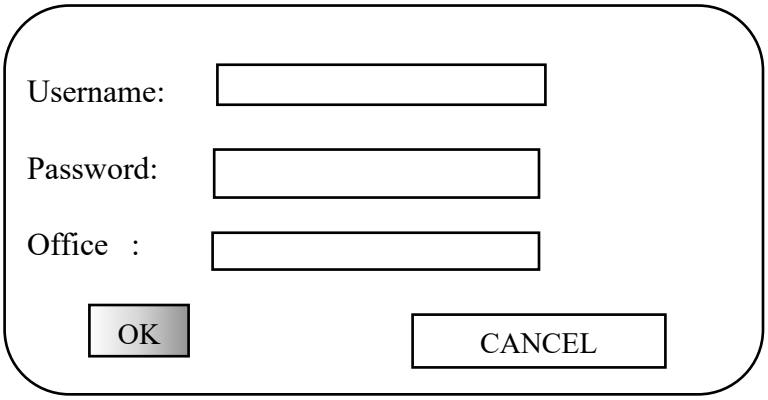
					employment number	

4.8 USER INTERFACE DESIGN

This section models the user interface view with which user interact in-order to use the software. It is designed such a way to provide the user with insight into the software

LOG IN FORM

The interface design is standard for all the users.



SEARCH BOX