



University of Dammam
College of Computer Science & Information Technology
Department of Computer Science

CS 411 – Software Engineering
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Software Testing Plan



For

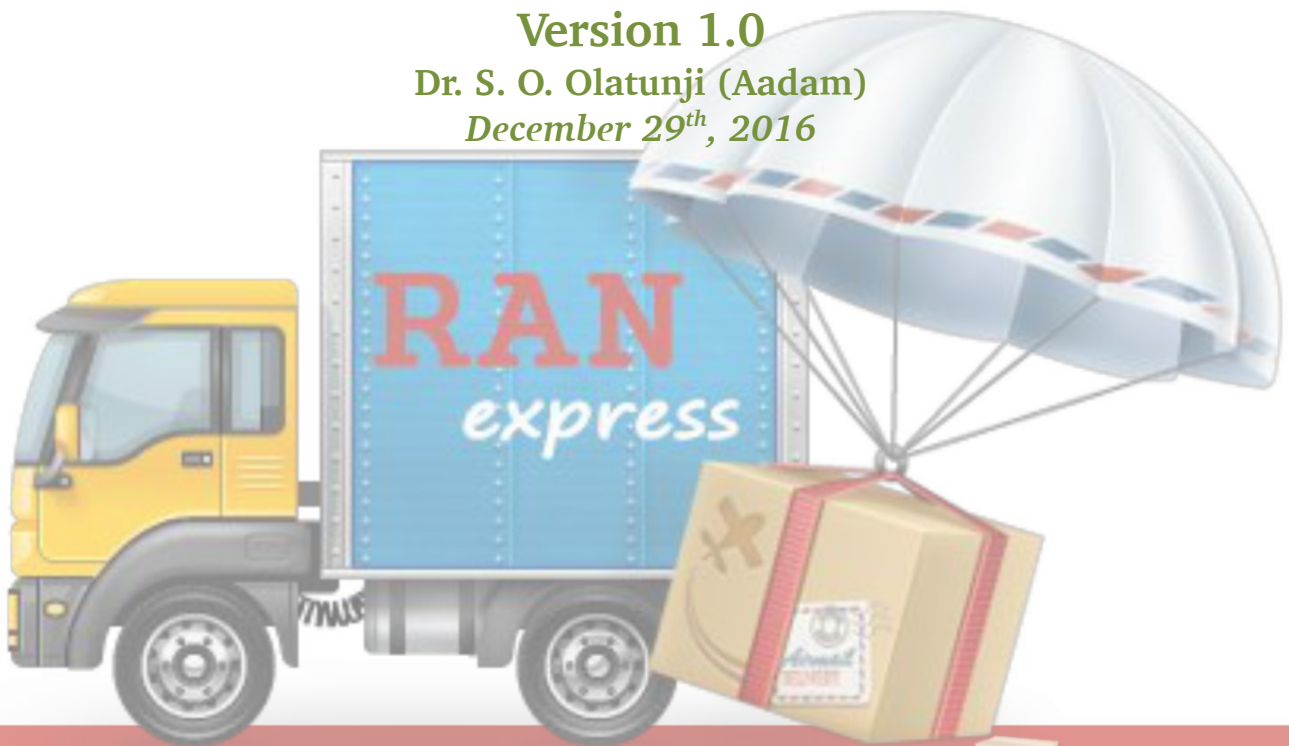
RAN Express

C5F1 – Team 1

Version 1.0

Dr. S. O. Olatunji (Aadam)

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This Software Testing Plan (STP) was prepared and provided as a deliverable for Software Engineering, CS 411, Term 1. It will be used by all RAN Express employees in the three distinct branches of RAN Shipping Company in Saudi Arabia.

This document is based in part on the IEEE Recommended Practice for STP Descriptions.

Team Members

#	Name	ID	Role	Signature
1			Leader	
2			Member	
3			Member	
4			Member	
5			Member	
6			Member	

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Revision History

This record is to keep track of the changes and updates that have been made to the SDS after the initial version on 19th of December 2016.

Name	Date	Reason for Changes	Version
All members	Dec. 19, 2016	Prepared initial version	0.1
All members	Dec. 20, 2016	Updated chapters 1, 2, 3	0.2
All members	Dec. 21, 2016	Updated chapter 4	0.3
All members	Dec. 24, 2016	Updated chapters 5, 6, 7, 8, 9	0.4
All members	Dec. 28, 2016	Spelling/Grammar mistakes	0.5
All members	Dec. 28, 2016	Updated layout	0.6
All members	Dec. 28, 2016	Complete review - Final version	1.0

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1 Introduction

This chapter introduces the topics related to RAN Express's Software Test Plan (STP) document. It specifies the document's objectives, background and scope. Furthermore, definitions, acronyms and references related to RAN Express and used in this document are also listed.

1.1 Objectives

The Software Test Plan (STP) for RAN Express proposes the scope, approach, resources, and time schedule of the testing activities. It defines the functions to be tested, the testing tasks to be completed and the person responsible for each task.

STP describes the plan for testing the developed desktop application versus the requirements acknowledged in the Software Requirements Specifications (SRS). This test is to ensure that the application developed during the course's period agrees with the defined software requirements.

1.2 Background

Delivering shipments to customers, from one city to another, to their doors is the mission RAN Shipping Company supports. To preserve and uphold this duty, RAN Express application was developed. It is intended to provide efficiency, facilitation, and assistance to the company's employees. It provides high quality of service to the primary users of the application.

Three key users are authorized to use the system, administration, customer service, and drivers. Their needs and necessities were collected and analyzed to design and implement the system required by the client, RAN Shipping Company.

RAN Express offers distinct features for each type of user. It provides multiple services for the admin regarding the management of employees and vehicles, and the screening of registered customers and shipments. Similarly, it delivers the facility of managing shipments and customers for a customer service employee. Likewise, the driver can access the feature of viewing his assigned shipments and his daily schedule. Lastly, common features among all users includes the accommodation of personal information.

Finally, RAN Express aims to cooperate with RAN Shipping Company's employees to attain their mission.

1.3 Scope

This STP document covers a complete and comprehensive software test plan for RAN Express. All functions incorporated in the application will be tested by applying component and integration testing. Moreover, validation and verification mechanisms will be used.

1.4 Definitions and Acronyms

Table 1.1 below shows the terminologies and their definitions used in this STP document.

Terminology	Definition
Component Testing	Component testing is a method where testing of each component in an application is done separately [4].

Software Design Specification (SDS)	Software Design Specification is a design document that describes all data, architectural, interface and component-level design for the software [2].
Software Development Life Cycle	A process used by software industry to design, develop and test high quality software [8].
Software Project Management Plan (SPMP)	Software Project Management Plan is a detailed plan that states the standards, procedures and project management tools that must be adopted by the project team. It includes several plans, such as plans regarding the project's cost, schedule and resources [2].
Software Requirements Specification (SRS)	Software Requirement Specification is a description of a software system to be developed, laying out functional and non-functional requirements [1].
Software Test Plan (STP)	Software Test Plan is a document describing the testing scope and activities. It is the basis for formally testing any software/product in a project [5].

Table 1.1 List of Definitions

Table 1.2 below shows the acronyms used throughout the document.

Acronym	Definition
GUI	Graphical User Interface
IDE	Integrated Development Environment
PC	Personal Computer
RAN	Reliable And Nimble
SDLC	Software Development Life Cycle
SDS	Software Design Specification
SPMP	Software Project Management Plan
SQL	Structures Query Language
SRS	Software Requirement Specification
STP	Software Test Plan
V&V	Verification and Validation

Table 1.2 List of Acronyms

1.5 References

- [1] "Theory-W software project management principles and examples," IEEE, 1998.
- [2] Society, "IEEE Std 830-1984," 1984. [Online]. Available: <http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=278253>. [Accessed 8 November 2014].
- [3] Sommerville, Software Engineering, 9 ed., 2010.
- [4] AlShallali, Bashair M., et al. Software Test Plan. 2016.
- [5] Test Plan. (n.d.). Retrieved December 28, 2016, from <http://softwaretestingfundamentals.com/test-plan/>
- [6] Developer, "iOS Developer library," [Online]. Available:

<https://developer.apple.com/library/ios/documentation/IDEs/Conceptual/AppDistributionGuide/LaunchingYourApponDevices/LaunchingYourApponDevices.html>.

[7] ORACLE, "Oracle® Migration Workbench User's Guide," 2007. [Online]. Available: http://docs.oracle.com/html/B15857_01/test.htm.

[8] T. (n.d.). SDLC - Overview. Retrieved December 27, 2016, from https://www.tutorialspoint.com/sdlc/sdlc_overview.htm

2 Test Items

RAN Express is to be tested as a whole. Information on the requirements the system must do can be found in the Software Requirements Specification (SRS). Information on the design and how the developed software system works is listed in the Software Design Specification (SDS).

In addition, data and database integrity will be tested as well as all user interfaces to ensure that they comply with GUI standards.

3 Features to Be Tested

RAN Express application will adhere to the requirements specified in the SRS document, section 3.2; Functional Requirements. It will also follow System Functionality identified in the SDS document, section 2.1.

4 Approach

This chapter defines all types of testing that apply to RAN Express application. It expresses:

- ⇒ Data and Database Integrity Testing
- ⇒ Component Testing
- ⇒ Integration Testing
- ⇒ Graphical User Interface Testing
- ⇒ Interface Testing
- ⇒ Validation and Verification Testing
- ⇒ Security Testing
- ⇒ Performance Testing
- ⇒ Constraints

4.1 Data and Database Integrity Testing

The database should be tested as a separate component. It will be tested without its integration with the application, RAN Express. This guarantees that database access methods and processes function properly without data inconsistency.

Technique:

- ⇒ Call each database access method and process feeding each with valid and invalid data.
- ⇒ Examine the database to certify that the data is populated as intended and review the returned data to confirm that the correct data was retrieved.

Completion criteria: All database access methods and processes operate as expected without any data corruption.

Special consideration: Small sized database with limited number of records should be used to increase the visibility of unexpected results.

4.1.1 Test Cases

In this section, test cases of testing the database follow ORACLE guidelines [5]. The test cases are not limited to the following tests in Table 4.1.

Test ID	Test Description	Expected Result	Verified (Yes/No)
1	Retrieving records of each table in the database.	All rows are retrieved.	Yes
2	Entering duplicated primary key in each table in the database.	Forbidden procedure.	Yes
3	Inserting a row into each table.	The row is inserted into the correct table.	Yes
4	Updating a row in each table.	The rows are updated.	Yes
5	Delete a row in each table.	The row is deleted with the following considerations: ⇒ If the row has a primary key that is a foreign key in another table with a “Cascade on Delete” property, then the corresponding records will automatically be deleted from the latter table. ⇒ If the row has a primary key that is a foreign key in another table with “Set NULL on Delete” property, then the corresponding records in the latter table will have the foreign keys set to null.	Yes
6	Inserting NULL values to columns that do not accept NULL values.	Forbidden procedure.	Yes
7	Inserting a row with mismatching data types.	Forbidden procedure.	Yes
8	Inserting a row with a column that exceeds its data length.	Forbidden procedure.	Yes
9	Inserting a row with inconsistent data in the foreign key field.	Forbidden procedure.	Yes

Table 4.1 Data and Database Integrity Test Cases

4.2 Component Testing

The key goal of component testing is to take each testable component of the software in the application, isolate it from other components, and determine whether it functions as expected or not. Component testing has proven its value in that a large percentage of defects are identified during its use [3].

Technique: Each component is tested separately before integrating them. Valid and invalid data is used to verify functions listed in the SRS document, section 2.2, Figure 2.2. The following must be verified:

- ⇒ The expected results occur when valid data is used.
- ⇒ The appropriate error/warning messages are displayed when invalid data is used.
- ⇒ All rules are properly applied.

Completion criteria: Each component functions as required without any defects.

Special consideration: Divide the components into smaller tasks to increase visibility of unexpected behavior.

4.2.1 Test Cases

This section provides test cases for each component of the application. Test cases verify each use case in the use case diagram.

4.2.1.1 Common Functions

4.2.1.1.1 Login

Table 4.2 shows test cases for the “Login” function. Test cases are not limited to the following items in the table.

Test ID	Login_001
Prerequisite	Own an account. User is already registered in database.
Test Procedure	<ol style="list-style-type: none"> 1. Tap on “Login” button with each of the following: <ol style="list-style-type: none"> a. Correct username and password. b. Correct username and incorrect password. c. Incorrect username and correct password. d. Incorrect username and password. e. Incorrect login for three consecutive times. 2. Tap on “Show Password” check box.
Expected Result	<ol style="list-style-type: none"> 1. Tap on “Login” button: <ol style="list-style-type: none"> a. Successful login and redirects user to his/her corresponding homepage. b. Error message is displayed: “Incorrect username or password.” c. Error message is displayed: “Incorrect username or password.” d. Error message is displayed: “Incorrect username or password.” e. Redirects user to “Forgot Password” interface. 2. Shows the password typed and not in asterisks.
Actual	Same as expected results.

Result	
Verified (Yes/No)	Yes

Table 4.2 "Login" Test Case

4.2.1.1.2 [Forgot Password](#)

Table 4.3 shows test cases for the “Forgot Password” function. Test cases are not limited to the following items in the table.

Test ID	ForgotPassword_001
Prerequisite	Own an account. User is already registered in database.
Test Procedure	<ol style="list-style-type: none"> 1. Tap on “Check” button with each of the following: <ol style="list-style-type: none"> a. Correct SSN. b. Unregistered SSN. c. Without SSN 2. After entering correct SSN, tap on “Send” button with each of the following: <ol style="list-style-type: none"> a. Correct answer to security question. b. Incorrect answer to security question. 3. Tap on “Back” button
Expected Result	<p>The results of the previous separate procedures:</p> <ol style="list-style-type: none"> 1. Tap on “Check” button: <ol style="list-style-type: none"> a. Displays the user’s corresponding security question. b. Displays a red error label that says: “Invalid username.” c. Displays a red error label that says: “Enter username.” 2. After entering correct SSN, tap on “Send” button: <ol style="list-style-type: none"> a. Sends an email to the user with a new password. b. Displays “Incorrect answer” error. 3. Redirects the user to the “Login” page.
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.3 "Forgot Password" Test Case

4.2.1.1.3 [Change Password](#)

Table 4.4 shows test cases for the “Change Password” function. Test cases are not limited to the following items in the table.

Test ID	ChangePassword_001
Prerequisite	Own an account. User is already registered in database.
Test Procedure	<ol style="list-style-type: none"> 1. Click on “Confirm New Password” textbox. 2. Tap on “Save” button with each of the following: <ol style="list-style-type: none"> a. Correct old, new, and confirm passwords. b. Incorrect old password, but new password and confirmed password are exactly the same. c. Correct old password, but confirmed is not the same as new password. 3. Tap on “Show Password” check box. 4. Tap on “Cancel” button.

Expected Result	<ol style="list-style-type: none"> Shows the strength of the newly entered password. If the password is too short or is not a combination of letters and numbrs, the “Save” button will be disabled. Tap on “Save” button: <ol style="list-style-type: none"> Displays “Password changed successfully, to save the changes you need to login again,” and redirects the user to the login page. Displays a red error label next to the old password that says: “Incorrect.” Displays a red error label next to the confirmed password that says: “Re-enter confirmed password.” Shows all the passwords and not in asterisks. Redirect the user to his/her homepage.
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.4 "Change Password" Test Case

4.2.1.1.4 [View/Update Profile](#)

Table 4.5 shows test cases for both “View Profile” and “Edit Profile” functions. Test cases are not limited to the following items in the table.

Test ID	View/Update_001
Prerequisite	Own an account. User is already registered in database and logged in.
Test Procedure	<ol style="list-style-type: none"> “View Profile” interface. <ol style="list-style-type: none"> Tap on “Update” button. Tap on “Homepage” button. “Edit Profile” interface. <ol style="list-style-type: none"> “Contact Information” panel <ol style="list-style-type: none"> Tap on “Edit” button with each of the following: <ol style="list-style-type: none"> Change a number with correct format. Change a number with incorrect format. Without selecting a number. Tap on “Remove” button with each of the following: <ol style="list-style-type: none"> Selecting a number Without selecting a number Tap on “Save New Number” button with each of the following: <ol style="list-style-type: none"> Enter number in correct format. Enter number in incorrect format. Tap on “Save” button with each of the following: <ol style="list-style-type: none"> All information is complete and correct. Incorrect or incomplete information. Tap on “Back” button Tap on “Homepage” button.
Expected Result	<ol style="list-style-type: none"> “View Profile” interface. <ol style="list-style-type: none"> Redirects the user to the “Update Profile” interface. Takes the user back to his/her homepage. “Edit Profile” interface.

	<ol style="list-style-type: none"> a. “Contact Information” panel <ol style="list-style-type: none"> I. Tap on “Edit” button: <ol style="list-style-type: none"> i. Updates the number. ii. Error message is displayed: “Error adding the new number. Incorrect phone number.” iii. Dialogue box that says: “Please select a number to update.” II. Click on “Remove” button <ol style="list-style-type: none"> i. Deletes selected number. ii. Dialogue box that says: “Please select a number to remove.” III. Tap on “Save New Number” button: <ol style="list-style-type: none"> i. Saves new number. ii. Error message displayed: “Error adding the new number. Incorrect phone number.” b. Tap on “Save” button: <ol style="list-style-type: none"> I. A dialogue box will show: “Employee updated.” II. Error message will show “Error updating the profile. Please fill all fields.” c. Takes the user back to “View Profile” interface. d. Takes the user back to his/her “Homepage” interface
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.5 “View/Update” Test Case

4.2.1.1.5 Security Question

Table 4.6 shows test cases for the “Security Question” function. Test cases are not limited to the following items in the table.

Test ID	SecurityQuestion_001
Prerequisite	Own an account. User is already registered in database.
Test Procedure	<ol style="list-style-type: none"> 1. Tap on “Ok” button with each of the following: <ol style="list-style-type: none"> a. Chose question and answered it. b. No chosen question, but answered old security question. c. No answer, but chose a new security question. 2. Tap on “Cancel” check box.
Expected Result	<ol style="list-style-type: none"> 1. Tap on “Ok” button <ol style="list-style-type: none"> a. Changes security question and answer. b. Displays message, “Please select a question.” c. Displays red asterisk and message, “Please enter the answer.” 2. Closes “Security Question” interface.
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.6 “Security Question” Test Case

4.2.1.2 User 1: Admin

4.2.1.2.1 Manage Employees

Table 4.7 shows test cases for “Manage Employees” functions. Test cases are not limited to the following items in the table.

Test ID	View/Update_001
Prerequisite	The user is an admin and is already logged in.
Test Procedure	<ol style="list-style-type: none"> 1. Click on “Hire New Employee” radio button. 2. Click on “Current Employees” radio button. 3. Click on “Homepage” button.
Expected Result	<ol style="list-style-type: none"> 1. Takes the user to “Hire New Employee” interface 2. Takes the user “Current Employees” interface 3. Takes the user back to his/her “Homepage” interface
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.7 "Manage Employees" Test Case

4.2.1.2.1.1 Hire New Employee

Table 4.8 shows test cases for the “Hire New Employee” function. Test cases are not limited to the following items in the table.

Test ID	HireNewEmployee_001
Prerequisite	The user is an admin and is already logged in.
Test Procedure	<ol style="list-style-type: none"> 1. Click on “Save” with each of the following: <ol style="list-style-type: none"> a. All information is correct and complete. b. Missing first name or last name. c. Incorrect SSN d. Missing birthday e. Missing nationality f. Missing gender g. Missing security question answer h. Missing job title i. Missing salary j. Incorrect salary k. Incorrect e-mail format l. Incorrect phone number format 2. Tap on “Back” button. 3. Tap on “Homepage” button.
Expected Result	<ol style="list-style-type: none"> 1. Click on “Save” button: <ol style="list-style-type: none"> a. Adds a new employee to the database and shows a dialog box that says: “Employee ‘name’ is now added to the system”. b. Displays red asterisk next to the field with the corresponding message dialog that says: “Please fill all fields.” c. Displays red asterisk next to the field with the corresponding message dialog that says: “*10 digits.” d. Displays red asterisk next to the field with the corresponding message dialog that says: “Error while adding: Please fill all fields.”

	<ol style="list-style-type: none"> e. Displays red asterisk next to the field with the corresponding message dialog that says: “Error while adding: Please fill all fields.” f. Displays red asterisk next to the field with the corresponding message dialog that says: Error while adding: Please fill all fields.” g. Displays red asterisk next to the field with the corresponding message dialog that says: Error while adding: Please fill all fields.” h. Displays red asterisk next to the field with the corresponding message dialog that says: Error while adding: Please fill all fields.” If the new employee is a driver, driving license must be added. i. Displays red asterisk next to the field with the corresponding message dialog that says: “Error while adding.” j. Displays red asterisk next to the field “Error while adding: The salary can’t be smaller than 3000.” k. Displays red asterisk next to the field with the corresponding message dialog that says: “Error while adding.” l. Displays red asterisk next to the field with the corresponding message dialog that says: “Error while adding.” <ol style="list-style-type: none"> 2. Takes the user back to “Manage Employees” interface 3. Takes the user back to his/her “Homepage” interface
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.8 "Hire New Employee" Test Case

4.2.1.2.1.2 Current Employees

Table 4.9 shows test cases for the “Current Employees” function. Test cases are not limited to the following items in the table.

Test ID	CurrentEmployees_001
Prerequisite	The user is an admin and is already logged in.
Test Procedure	<p>All employees are originally displayed in the table.</p> <ol style="list-style-type: none"> 1. Click on “Search” with each of the following: <ol style="list-style-type: none"> a. Correct SSN b. Incorrect SSN 2. Tap on “Update” button with each of the following: <ol style="list-style-type: none"> a. With SSN b. Without SSN 3. Tap on “Fire” button. 4. Tap on “Back” button. 5. Tap on “Homepage” button.
Expected Result	<ol style="list-style-type: none"> 1. Click on “Search” button: <ol style="list-style-type: none"> a. Displays employee’s information in the table. b. Display red error label that says: “Not Found.” 2. Click on “Update” button: <ol style="list-style-type: none"> a. Directs the user to “Update Employee” interface. b. Dialogue box that says: “Please select an employee.”

	<ol style="list-style-type: none"> 3. Employee's SSN is removed from the system. 4. Takes the user back to "Manage Employees" interface 5. Takes the user back to his/her "Homepage" interface
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.9 "Current Employees" Test Case

4.2.1.2.1.3 Update Employee

Table 4.10 shows test cases for the "Update Employee" function. Test cases are not limited to the following items in the table.

Test ID	UpdateEmployee 001
Prerequisite	The user is an admin and is already logged in.
Test Procedure	<ol style="list-style-type: none"> 1. "Contact Information" panel <ol style="list-style-type: none"> a. Tap on "Edit" button with each of the following: <ol style="list-style-type: none"> i. Change a number with correct format. ii. Change a number with incorrect format. iii. Without selecting a number. b. Tap on "Remove" button with each of the following: <ol style="list-style-type: none"> i. Selecting a number ii. Without selecting a number c. Tap on "Save New Number" button with each of the following: <ol style="list-style-type: none"> iii. Enter number in correct format. iv. Enter number in incorrect format. 2. Click on "Save" with each of the following: <ol style="list-style-type: none"> a. All information is correct and complete. b. Missing first name or last name. c. Missing birthday d. Missing salary e. Incorrect salary f. Incorrect e-mail format g. Duplicate email 3. Tap on "Back" button. 4. Tap on "Homepage" button.
Expected Result	<ol style="list-style-type: none"> 1. Contact Information" panel <ol style="list-style-type: none"> a. Tap on "Edit" button: <ol style="list-style-type: none"> i. Updates the number. ii. Error message is displayed: "Error updating the phone number: Incorrect phone number." iii. Dialogue box that says: "Please select a number to update." b. Click on "Remove" button: <ol style="list-style-type: none"> i. Deletes selected number. ii. Dialogue box that says: "Please select a number to remove." c. Tap on "Save New Number" button: <ol style="list-style-type: none"> i. Saves new number. ii. Error message displayed: "Error adding the new

	number: Incorrect phone number.”
	2. Click on “Save” button:
	a. Shows a dialog box that says: “Employee’s information updated successfully”.
	b. Displays red asterisk next to the field with the corresponding message dialog that says: “Error updating ‘ESSN’: Please fill all fields.”
	c. Displays red asterisk next to the field with the corresponding message dialog that says: “Error updating ‘ESSN’: Please fill all fields.”
	d. Displays red asterisk next to the field with the corresponding message dialog that says: “Error updating ‘ESSN’: Please fill all fields.”
	e. Displays red asterisk next to the field with the corresponding message dialog that says: “Error updating ‘ESSN’ Please fill all fields: The salary can’t be smaller than 3000.”
	f. Displays red asterisk next to the field with the corresponding message dialog that says: “Invalid format”
	g. Displays red asterisk next to the field with the corresponding message dialog that says: “Error in updating ‘ESSN’. Duplicate entry for email.”
	3. Takes the user back to “Current Employees” interface
	4. Takes the user back to his/her “Homepage” interface
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.10 "Update Employee" Test Case

4.2.1.2.2 Manage Vehicles

Table 4.11 shows test cases for “Manage Vehicles” functions. Test cases are not limited to the following items in the table.

Test ID	ManageVehicles_001
Prerequisite	The user is an admin and is already logged in.
Test Procedure	1. Click on “Add New Vehicle” radio button. 2. Click on “Current Vehicles” radio button. 3. Click on “Homepage” button.
Expected Result	1. Takes the user to “Add New Vehicle” interface 2. Takes the user “Current Vehicles” interface 3. Takes the user back to his/her “Homepage” interface
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.11 "Manage Vehicles" Test Case

4.2.1.2.2.1 Add New Vehicle

Table 4.12 shows test cases for the “Add New Vehicle” function. Test cases are not limited to the following items in the table.

Test ID	AddNewVehicle_001
Prerequisite	The user is an admin and is already logged in.
Test Procedure	<ol style="list-style-type: none"> 1. Click on “Type Not Found” radio button. 2. Click on “Add Vehicle” with each of the following: <ol style="list-style-type: none"> a. All information is correct and complete b. Incorrect Plate Number c. Missing Vehicle Type d. Missing Max Load 3. Tap on “Back” button. 4. Tap on “Homepage” button.
Expected Result	<ol style="list-style-type: none"> 1. Enables “New Type” text field 2. Click on “Add Vehicle” button: <ol style="list-style-type: none"> a. Adds a new vehicle to the database. Dialog box displays: “Vehicle added successfully.” b. Displays red asterisk next to the field “ex. 123RTY” with the correct message dialog that says: “Error adding vehicle.” c. Displays red asterisk next to the field with the correct message dialog that says: “Error adding vehicle. Please fill all fields.” d. Displays red asterisk next to the field with the correct message dialog that says: “Error adding vehicle. Please fill all fields.” 3. Takes the user back to “Manage Vehicles” interface 4. Takes the user back to his/her “Homepage” interface
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.12 "Add New Vehicle" Test Case

4.2.1.2.2.2 Current Vehicles

Table 4.13 shows test cases for the “Current Vehicles” function. Test cases are not limited to the following items in the table.

Test ID	CurrentVehicles_001
Prerequisite	The user is an admin and is already logged in.
Test Procedure	<p>All registered vehicles are already displayed.</p> <ol style="list-style-type: none"> 1. Click on “Search” with each of the following: <ol style="list-style-type: none"> a. Correct Plate Number b. Incorrect Plate Number c. Un-registered Plate Number 2. Tap on “Delete” button. 3. Tap on “Back” button. 4. Tap on “Homepage” button.
Expected Result	<ol style="list-style-type: none"> 1. Click on “Search” button: <ol style="list-style-type: none"> a. Displays vehicle’s information in the table. b. Displays red error label that says: “ex.123RTY.” c. Displays red error label that says: “Not Found.” 2. Vehicle is removed from the system. 3. Takes the user back to “Manage Vehicles” interface 4. Takes the user back to his/her “Homepage” interface
Actual Result	Same as expected results.

Verified (Yes/No)	Yes
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Table 4.13 "Current Vehicles" Test Case

4.2.1.2.3 View Customers

Table 4.14 shows test cases for the “View Customers” function. Test cases are not limited to the following items in the table.

Test ID	ViewCustomers_001
Prerequisite	The user is an admin and is already logged in.
Test Procedure	<ol style="list-style-type: none"> 1. Click on “Month and Year” radio button. 2. Click on “SSN” radio button. 3. Click on “Search” with each of the following. <ol style="list-style-type: none"> a. Month and year specified b. Unspecified month and year c. Unspecified month d. Unspecified year e. Correct SSN f. Incorrect SSN format g. Un-registered SSN 4. Tap on “Homepage” button.
Expected Result	<ol style="list-style-type: none"> 1. Enables “Month and Year” combo boxes and table is filled with registered customers. 2. Enables the “SSN” text field. 3. Click on “Search” button: <ol style="list-style-type: none"> a. Displays customers in the table. b. Displays a dialog box that says: “Please select a month and year.” c. Displays a dialog box that says: “Please select a month.” d. Displays a dialog box that says: “Please select a year.” e. Lists customer with the corresponding SSN. f. Displays red error label that says: “*10 digits” g. Displays red error label that says: “Not Found” 4. Takes the admin back to his/her “Homepage”
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.14 "View Customers" Test Case

4.2.1.2.4 Customer Information

Table 4.15 shows test cases for the “Customer Information” function. Test cases are not limited to the following items in the table.

Test ID	CusotmerInformation_001
Prerequisite	The user is an admin and is already logged in.
Test Procedure	<p>All customer’s information is viewed.</p> <ol style="list-style-type: none"> 1. Click on “Back” button.
Expected Result	<ol style="list-style-type: none"> 1. Closes the window.

Actual Result	Same as expected results.
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Verified (Yes/No)	Yes
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Table 4.15 "Customer Information" Test Case

4.2.1.2.5 View Shipments

Table 4.16 shows test cases for the “View Shipments” function. Test cases are not limited to the following items in the table.

Test ID	ViewShipments_001
Prerequisite	The user is an admin and is already logged in.
Test Procedure	<ol style="list-style-type: none"> 1. Click on “Month and Year” radio button. 2. Click on “Shipment Number” radio button. 3. Click on “Search” with each of the following. <ol style="list-style-type: none"> a. Month and year specified b. Unspecified month or year c. Unspecified month d. Unspecified year e. Correct shipment number f. Incorrect shipment number format g. Un-registered shipment number 4. Tap on “Homepage” button.
Expected Result	<ol style="list-style-type: none"> 1. Enables “Month and Year” combo boxes and forces the admin to specify the month and year to search shipments. 2. Enables the “Shipment Number” text field. 3. Click on “Search” button: <ol style="list-style-type: none"> a. Displays shipments in the table. b. Displays an error message “Please select a month and year.” c. Displays an error message “Please select a month.” d. Displays an error message “Please select a year.” e. Lists shipment with the corresponding Shipment Number. f. Displays red error label that says: “wrong format: RA*****N” g. Displays red error label that says: “Not Found” 4. Takes the admin back to his/her “Homepage”
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.16 "View Shipments" Test Case

4.2.1.2.6 Shipment Information

Table 4.17 shows test cases for the “Shipment Information” function. Test cases are not limited to the following items in the table.

Test ID	ShipmentInformation_001
Prerequisite	The user is customer service and is already logged in.
Test Procedure	<ol style="list-style-type: none"> 1. All shipment’s information is viewed. 2. Click on “Back” button.
Expected Result	2. Closes the window.

Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.17 "Shipment Information" Test Case

4.2.1.3 User 2: Customer Service

4.2.1.3.1 Manage Customers

Table 4.18 shows test cases for “Manage Customers” functions. Test cases are not limited to the following items in the table.

Test ID	ManageCustomers_001
Prerequisite	The user is customer service and is already logged in.
Test Procedure	<ol style="list-style-type: none"> 1. Click on “Add New Customer” radio button. 2. Click on “Current Customers” radio button. 3. Click on “Homepage” button.
Expected Result	<ol style="list-style-type: none"> 1. Takes the user to “Add New Customer” interface 2. Takes the user to “Current Customers” interface 3. Takes the user back to his/her “Homepage” interface
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.18 "Manage Customers" Test Case

4.2.1.3.1.1 Add New Customer

Table 4.19 shows test cases for the “Add New Customer” function. Test cases are not limited to the following items in the table.

Test ID	AddNewCustomer_001
Prerequisite	The user is customer service and is already logged in.
Test Procedure	<ol style="list-style-type: none"> 1. Click on “Add Customer” with each of the following: <ol style="list-style-type: none"> a. All information is correct and complete. b. Missing first name or last name. c. Missing city, building or street. d. Incorrect e-mail format e. Duplicate e-mail f. Incorrect phone number format g. Incorrect CSSN format h. Missing Gender 2. Tap on “Back” button. 3. Tap on “Homepage” button.
Expected Result	<ol style="list-style-type: none"> 1. Click on “Save” button: <ol style="list-style-type: none"> a. Adds a new customer to the database. b. Displays red asterisk next to the missing fields and a dialogue box that says: “Error in adding the new customer: Please fill all fields.” c. Displays red asterisk next to the missing fields and a dialogue box that says: “Error adding the new customer: Please fill all fields.” d. Displays red error label that shows an email’s correct format

	<p>and dialogue box that says: “Error in adding the new customer.”</p> <ol style="list-style-type: none"> Displays red error label that shows an email’s correct format and dialogue box that says: “Error in adding the new customer. Duplicate entry for email.” Displays red error label that shows a phone number’s correct format “5*****” dialogue box that says: “Error in adding the new customer.” Displays red error label that says: “*10 digits”. Displays red asterisk next to the missing fields. <ol style="list-style-type: none"> Takes the user back to “Manage Customers” interface or “Add Shipment” interface, depending on where he/she came from previously. Takes the user back to his/her “Homepage” interface
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.19 "Add New Customer" Test Case

4.2.1.3.1.2 Current Customers

Table 4.20 shows test cases for the “Current Customers” function. Test cases are not limited to the following items in the table.

Test ID	CurrentCusotmers_001
Prerequisite	The user is customer service and is already logged in.
Test	All customers are originally displayed.
Procedure	<ol style="list-style-type: none"> Click on “Search” with each of the following: <ol style="list-style-type: none"> Correct CSSN Incorrect CSSN format Un-registered CSSN Tap on “Update” button. <ol style="list-style-type: none"> Chose customer Did not choose customer Tap on “Back” button.
Expected Result	<ol style="list-style-type: none"> Click on “Search” button: <ol style="list-style-type: none"> Displays customer’s information in the table. Displays red error label that says: “*10 digits” Displays red error label that says: “Not Found.” Click on “Search” button: <ol style="list-style-type: none"> Takes the user to “Update Customer” interface Displays dialogue box that says: “Please select a customer.” Takes the user back to “Manage Customers” interface
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.20 "Current Customers" Test Case

4.2.1.3.1.3 Update Customer

Table 4.21 shows test cases for the “Update Customer” function. Test cases are not limited to the following items in the table.

Test ID	UpdateCustomer_001
Prerequisite	The user is customer service and is already logged in.
Test Procedure	<ol style="list-style-type: none"> 1. “Contact Information” panel <ol style="list-style-type: none"> a. Tap on “Edit” button with each of the following: <ol style="list-style-type: none"> i. Change a number with correct format. ii. Change a number with incorrect format. iii. Without selecting a number. b. Tap on “Remove” button with each of following: <ol style="list-style-type: none"> i. Selecting a number ii. Without selecting a number c. Tap on “Save New Number” button with each of the following: <ol style="list-style-type: none"> i. Enter number in correct format. ii. Enter number in incorrect format. 3. Click on “Save” with each of the following: <ol style="list-style-type: none"> a. All information is correct and complete. b. Incorrect E-mail format c. Duplicate E-mail 4. Tap on “Back” button. 5. Tap on “Homepage” button.
Expected Result	<ol style="list-style-type: none"> 1. Contact Information” panel <ol style="list-style-type: none"> a. Tap on “Edit” button: <ol style="list-style-type: none"> i. Updates the number. ii. Error message is displayed: “Error updating the phone number.” iii. Dialogue box that says: “Please choose a number to update.” b. Click on “Remove” button: <ol style="list-style-type: none"> i. Dialogue box says: “Phone number: ‘number’ is removed from the system.” ii. Dialogue box that says: “Please select a number to remove.” c. Tap on “Save New Number” button: <ol style="list-style-type: none"> i. Saves new number. ii. Error message displayed: “Error adding the new number: Incorrect phone number.” 2. Click on “Save” button: <ol style="list-style-type: none"> a. Shows a dialog box that says: “Customer’s information updated successfully”. b. Dialog box that says: “Error updating the customer.” c. Dialog box that says: “Error updating the customer. Duplicate entry for e-mail.” 3. Takes the user back to “Current Customers” interface 4. Takes the user back to his/her “Homepage” interface
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.21 "Update Customer" Test Case

4.2.1.3.2 Manage Shipments

Table 4.22 shows test cases for “Manage Shipments” functions. Test cases are not limited to the following items in the table.

Test ID	ManageShipments_001
Prerequisite	The user is customer service and is already logged in.
Test Procedure	<ol style="list-style-type: none"> 1. Click on “Add New Shipment” radio button. 2. Click on “Current Shipments” radio button. 3. Click on “Track Shipments” radio button. 4. Click on “Homepage” button.
Expected Result	<ol style="list-style-type: none"> 1. Takes the user to “Add New Shipment” interface 2. Takes the user to “Current Shipments” interface 3. Takes the user to “Track Shipments” interface. 4. Takes the user back to his/her “Homepage” interface
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.22 "Manage Shipments" Test Case

4.2.1.3.2.1 Add New Shipments

Table 4.23 shows test cases for the “Add New Shipment” function. Test cases are not limited to the following items in the table.

Test ID	AddNewShipment_001
Prerequisite	The user is customer service and is already logged in.
Test Procedure	<ol style="list-style-type: none"> 1. Click on “Add Shipment” with each of the following: <ol style="list-style-type: none"> a. All information is correct and complete. b. Sender or receiver SSN not registered c. Same sender and receiver SSN d. Driver SSN not selected e. Weight not entered f. Weight entered is 0 or 0.0 g. Type not selected h. Pick up date not selected 2. Tap on “Back” button. 3. Tap on “Homepage” button.
Expected Result	<ol style="list-style-type: none"> 1. Click on “Save” button: <ol style="list-style-type: none"> a. Adds a new shipment to the database and a dialogue box says: “New shipment added successfully.” b. “Add New Customer” button is enabled. c. Displays red asterisk next to the fields and an error message “Sender and receiver cannot have the same SSN. Error in adding the new shipment” d. Displays red asterisk next to the missing fields and an error message “Error in adding new shipment. Please fill all fields.” e. Displays red asterisk next to the missing fields and an error message “Error in adding new shipment. Please enter a valid weight.” f. Displays red asterisk next to the missing fields and an error

	<ul style="list-style-type: none"> message “Error in adding new shipment. Please fill all fields.” g. Displays red asterisk next to the missing fields and an error message “Error in adding new shipment. Please fill all fields.” h. Displays red asterisk next to the missing fields and an error message “Error in adding new shipment. Please fill all fields.”
	<ul style="list-style-type: none"> 2. Takes the user back to “Manage Shipments” interface 3. Takes the user back to his/her “Homepage” interface
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.23 “Add New Shipment” Test Case

4.2.1.3.2.2 Current Shipments

Table 4.24 shows test cases for the “Current Shipments” function. Test cases are not limited to the following items in the table.

Test ID	CurrentShipments_001
Prerequisite	The user is customer service and is already logged in.
Test Procedure	<p>All shipments are originally viewed in the table.</p> <ul style="list-style-type: none"> 1. Click on “Search” with each of the following: <ul style="list-style-type: none"> a. Correct Shipment Number b. Incorrect Shipment Number Format c. Un-registered Shipment Number 2. Tap on “Delete” button with each of the following: <ul style="list-style-type: none"> a. With a shipment selected b. Without a shipment selected 3. Tap on “Update” button with each of the following: <ul style="list-style-type: none"> a. With a shipment selected b. Without a shipment selected 4. Tap on “Back” button. 5. Tap on “Homepage” button.
Expected Result	<ul style="list-style-type: none"> 1. Click on “Search” button: <ul style="list-style-type: none"> a. Displays shipment’s information in the table. b. Displays red error label that says: “wrong format: RA*****N.” c. Displays red error label that says: “Not Found.” 2. Click on “Delete” button: <ul style="list-style-type: none"> a. Deletes shipment from the database. b. Displays an error message that says: “Please select a shipment.” 3. Click on “Update” button: <ul style="list-style-type: none"> a. Takes the user to “Update Shipment” interface. b. Displays an error message that says: “Please select a shipment.” 4. Takes the user back to “Manage Shipments” interface. 5. Takes the user back to his/her “Homepage” interface.
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.24 "Current Shipments" Test Case

4.2.1.3.2.3 Update Shipment

Table 4.25 shows test cases for the "Update Shipment" function. Test cases are not limited to the following items in the table.

Test ID	UpdateShipment_001
Prerequisite	The user is customer service and is already logged in.
Test Procedure	<ol style="list-style-type: none"> Click on "Update" with each of the following: <ol style="list-style-type: none"> All information is correct and complete. Incorrect Receiver SSN Format Unregistered receiver SSN Same Receiver and Sender SSN Missing pick up status Missing pick up date Missing arrival status Missing weight Tap on "Back" button. Tap on "Homepage" button.
Expected Result	<ol style="list-style-type: none"> Click on "Save" button: <ol style="list-style-type: none"> Displays "Shipment updated successfully." Displays error label "*10 digits" and a dialogue box that says: "Error while updating shipment." "Add New Customer" button is enabled. Displays red asterisk next to the missing fields and an error message "Sender and receiver cannot have the same SSN." Displays red asterisk next to the missing fields and an error message "Error while updating the shipments. Please fill all fields." Displays red asterisk next to the missing fields and an error message "Error while updating the shipments. Please fill all fields." Displays red asterisk next to the missing fields and an error message "Error while updating the shipments. Please fill all fields." Displays red asterisk next to the missing fields and an error message "Error while updating the shipments. Please fill all fields." Takes the user back to "Current Shipments" interface Takes the user back to his/her "Homepage" interface
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.25 "Update Shipment" Test Case

4.2.1.3.2.4 Track Shipments

Table 4.26 shows test cases for the "Track Shipments" function. Test cases are not limited to the following items in the table.

Test ID	TrackShipments_001
Prerequisite	The user is customer service and is already logged in.

Test Procedure	All shipments are originally viewed in the table. 1. Click on “Search” with each of the following: a. Correct Shipment Number b. Incorrect Shipment Number Format c. Un-registered Shipment Number 2. Tap on “Back” button. 3. Tap on “Homepage” button.
Expected Result	1. Click on “Search” button: a. Displays shipment’s information in the table. b. Displays red error label that says: “wrong format: RA*****N.” c. Displays red error label that says: “Not Found.” 2. Takes the user back to “Manage Shipments” interface. 3. Takes the user back to his/her “Homepage” interface.
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.26 "Track Shipments" Test Case

4.2.1.4 User 3: Driver

4.2.1.4.1 Assigned Shipments

Table 4.27 shows test cases for the “Assigned Shipments” function. Test cases are not limited to the following items in the table.

Test ID	AssignedShipments_001
Prerequisite	The user is a driver and is already logged in.
Test Procedure	1. Click on “Daily Schedule” button. 2. Tap on “Homepage” button.
Expected Result	1. Takes the user to “Daily Schedule” interface. 2. Takes the user back to his “Homepage” interface.
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.27 "Assigned Shipments" Test Case

4.2.1.4.2 Daily Schedule

Table 4.28 shows test cases for the “Daily Schedule” function. Test cases are not limited to the following items in the table.

Test ID	DailySchedule_001
Prerequisite	The user is a driver and is already logged in.
Test Procedure	1. Click on “Save” button with each of the following: b. A vehicle is selected c. A vehicle is not selected 2. Click on “Back” button 3. Tap on “Homepage” button.
Expected Result	1. Click on “Save” button: a. The vehicle is reserved for the driver for the day

	b. Error message is displayed that says: “Please select a vehicle.” 2. Takes the driver back to his “Assigned Shipments” interface. 3. Takes the user back to his “Homepage” interface.
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.28 “Daily Schedule” Test Case

4.3 Integration Testing

Integration testing is implemented after component testing to make sure the components interact with each other and conform to the specifications. Integration testing refers to connecting all the components or units together, resulting in the complete system.

Technique: Test the functions of the combined components in an incremental manner by adding one component at a time. This reduces the execution time, since testers do not wait for the whole project to finish and it increases the visibility of the bugs.

Completion criteria: Combining all components to reach the end of the system that should work as intended predicted.

Special consideration: Go back to component testing if the integration of a new component incorporates errors.

4.3.1 Test Cases

This section provides test cases for integrating the application. Test cases verifies the connection between components starting from three main interfaces:

- ⇒ Admin’s Homepage
- ⇒ Customer Service’s Homepage
- ⇒ Driver’s Homepage

4.3.1.1 Admin’s Homepage

Table 4.29 shows test cases of the integration between components starting from the admin’s homepage. Test cases are not limited to the following items in the table.

Test ID	AdminHomepage_001
Prerequisite	Admin is logged into the system.
Test Procedure	Try the following procedures separately: <ol style="list-style-type: none"> 1. Access the admin’s “Profile” and do the component’s test cases again (Section 4.2.1.1.4). 2. Access the “Employees” and do the component’s test cases again (Section 4.2.1.2.1). 3. Access the “Vehicles” and do the component’s test cases again (Section 4.2.1.2.2). 4. Access the “Customers” and do the component’s test cases again (Section 4.2.1.2.3). 5. Access the “Shipments” and do the component’s test cases again (Section 4.2.1.2.4). 6. Access the “Change Password” and do the component’s test cases again (Section 4.2.1.1.3).
Expected	The results of the previous separated procedures are the same as the

Result	components' results in the previous sections with the following additional results: 1. The admin's name travels between interfaces. 2. All confirmation and error messages are displayed
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.29 "Admin Homepage" Test Case

4.3.1.2 Customer Service's Homepage

Table 4.30 shows test cases of the integration between components starting from the customer service's homepage. Test cases are not limited to the following items in the table.

Test ID	CusotmServiceHomepage_001
Prerequisite	Customer service is logged into the system.
Test Procedure	Try the following procedures separately: 1. Access the customer service's "Profile" and do the component's test cases again (Section 4.2.1.1.4). 2. Access the "Customers" and do the component's test cases again (Section 4.2.1.3.1). 3. Access the "Shipments" and do the component's test cases again (Section 4.2.1.3.2). 4. Access the "Change Password" and do the component's test cases again (Section 4.2.1.1.3).
Expected Result	The results of the previous separated procedures are the same as the components' results in the previous sections with the following additional results: 1. The customer service's name travels between interfaces. 2. All confirmation and error messages are displayed
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.30 "Customer Service Homepage" Test Case

4.3.1.3 Driver's Homepage

Table 4.31 shows test cases of the integration between components starting from the driver's homepage. Test cases are not limited to the following items in the table.

Test ID	DriverHomepage_001
Prerequisite	Driver is logged into the system.
Test Procedure	Try the following procedures separately: 1. Access the driver's "Profile" and do the component's test cases again (Section 4.2.1.1.4). 2. Access the "Assigned Shipments" and do the component's test cases again (Section 4.2.1.4.1). 3. Access the "Change Password" and do the component's test cases again (Section 4.2.1.1.3).
Expected Result	The results of the previous separated procedures are the same as the components' results in the previous sections with the following additional results:

	1. The driver's name travels between interfaces. 2. All confirmation and error messages are displayed
Actual Result	Same as expected results.
Verified (Yes/No)	Yes

Table 4.31 "Driver Homepage" Test Case

4.4 Graphical User Interface Testing

GUI testing verifies all user interactions with the system. It ensures that all user interfaces provide the user appropriate navigation through their corresponding functions. Furthermore, it guarantees that the objects within the GUI function operate as expected and agree with RAN Shipping Company's requirements.

Graphical User Interface testing is considered one of the most significant types of testing since it tests the look and feel of the system. It confirms the navigation of passing from one activity to another, one interface to another, and one field to another.

Technique: Screenshots of the interfaces are sent to the supervisor to ensure all functions are incorporated and RAN Shipping Company employees' roles are facilitated.

Completion criteria: Each interface should be successfully approved of and consistent with acceptable standards.

Special consideration: Any change in the interface should be discussed with developing team.

Screenshots will be presented to Dr. Sunday Olatunji, project supervisor. Any changes or feedback should be noted by all team members.

4.5 Interface Testing

Interface testing is executed to evaluate the whole system and components' passage of data and control. It should guarantee that interactions between these modules are working properly and errors are handled correctly.

This section emphasizes on the connection between the application and the external component, mail server.

4.5.1 Mail Server

RAN Express should be able to send e-mails to the users who forget their passwords. RAN Express needs authentication from the mail server to send those emails.

4.6 Validation and Verification Testing

V&V testing is concerned with the validation of the application's requirements compared to the written requirements and user satisfaction. Verification usually takes place before validation to make sure the software follows its specifications.

Technique: Verification testing is done by walking through the requirements and design specifications, the testing plan, software code, and test cases. The is validated by making sure all client's expectations are met.

Completion criteria: The application should successfully be verified and validated without defects or errors. It should also match the client's, RAN Shipping Company, requirements.

4.7 Security Testing

A security test will be conducted to guarantee that all authorized users are allowed to access their own accounts and cannot see other user's information, unless they have the access to. For example, an admin employee can see information regarding other employees but a customer service employee cannot.

Technique: Accessing the system with incorrect usernames and passwords should restrict the user from entering the system.

Completion criteria: Security testing verifies that only registered users can access their accounts.

4.8 Performance Testing

Performance testing of any application measures response time, stability under workload, and other time sensitive processes. The purpose of performance testing is to verify, validate, measure, and investigate if the performance requirements are met. Performance testing is usually executed several times, each using a different test case with different load on the system. Response time for RAN Express should be very low and not exceed five seconds for each request. Also, the system should be available twenty-four hours a day, every day for all employees. The system can only be accessed by a single user, since it is not connected to a main server.

Technique: Perform different functions to validate application response times.

Completion criteria: Successful completion of the test cases and transactions for each user without any failures and within the acceptable time duration.

4.9 Constraint

All milestones and deadlines noted on the Software Plan Management Plan (SPMP) must be met.

5 Pass/Fail Criteria

RAN Express must satisfy the following requirements:

- ⇒ Functions related to each of the primary users shall work as specified in the SRS document.
- ⇒ Use a proper GUI that limits user's error entry to the least.
- ⇒ The system shall handle the user's invalid inputs to avoid runtime-errors.
- ⇒ Different test cases must be passed successfully and any discovered bugs must be fixed.
- ⇒ All test cases dealing with critical functionalities must be passed
- ⇒ All discovered defects must be fixed

6 Testing Process

This chapter comprises of test deliverables, testing tasks, responsibility, resources and schedule.

6.1 Test Deliverables

The document that will be produced while working on the test phase is the Software Test Plan(STP). After passing the testing phase, the project will finally be presented.

6.2 Testing Tasks

Listed below are the testing tasks:

- ⇒ Arrange STP document.
- ⇒ Prepare the SRS and SDS documents.
- ⇒ Prepare the hardware test environment.
- ⇒ Prepare the software test environment.
- ⇒ Execute all test activities using different methods.
- ⇒ Handle errors that occurred during testing.
- ⇒ Maintain the application if a change occurs.

6.3 Responsibility

The team members are responsible for testing the application, by following the specifications of each component and integrating all testing tasks. This includes preparing the compulsory documents and handling consequential errors from testing the system.

6.4 Resources

Below, Table 6.1, are the resources the team members are using to complete the software testing phase.

Resources Category	Description
Hardware	A personal computer that has access to high speed internet connection.
Software	⇒ NetBeans 8.1 IDE
	⇒ MySQL Workbench
	⇒ Windows OS 7 or higher
Support	⇒ Technical support team responsible for MySQL Server.
	⇒ Support for building the database from Ms. Elham Shafout, previous database instructor.
Human	Team members with skills that were previously mentioned in the SPMP document, section 3.1.3; Staff Training.

Table 6.1 Software Testing Resources

6.5 Schedule

The schedule of the testing tasks is shown in Table 6.2.

Task	Date
Software Requirement Specification (SRS)	November 10, 2016
Software Design Specification (SDS)	December 11, 2016
Develop test cases	December 18, 2016
Execute testing activities using various testing approaches	December 21, 2016
Troubleshoot errors occurred during testing	December 22, 2016
Modify the system accordingly	December 23, 2016

7 Environment Requirements

This chapter includes the environmental requirements of the hardware, software, server, and incorporated risks and assumptions.

7.1 Hardware

The hardware obligatory to apply the testing activities are:

- ⇒ High speed internet connection
- ⇒ Personal computer

7.2 Software

The software requirements required to employ the testing activities are:

- ⇒ Browser
- ⇒ MySQL Workbench
- ⇒ NetBeans 8.1 IDE

7.3 Server

The minimal server necessity required to operate the testing activities is:

- ⇒ Mail Server
- ⇒ MySQL Server

7.4 Risk and Assumptions

To produce a high-quality software, RAN Express, that meets RAN Shipping Company employees' expectations, the software has to go through the Software Development Life Cycle stages. SDLC is subject to delay due to the quick evolution in technology. This rapid development causes changes in the coding mechanisms, which might cause changes in the test plan. The potential risks and their contingency plans are listed below.

7.4.1 Test Item Availability

Inaccessibility of an item related to a specific unit may cause an interruption in testing that unit. Consequently, it might delay the overall testing process. The plan is to test other items that are ready to be tested until the incomplete ones become available.

7.4.2 Test Resources Availability

Absence of test resources may cause a deferral in the test plan of completed units. For example, the servers required may shutdown due to heavy load, technical issues, maintenance, etc. If this occurs, it is best to contact the support team and know when the server will go back up.

7.4.3 Time Constraints

Any unexpected delay, change in the schedule, or addition of further features to the application will cause a delay in the delivery time. The plan is to guarantee that the main functions are correctly operating and if necessary, increase the working hours to meet the estimated delivery time.

8 Change Management Procedures

Any change or modification to the test plan must follow a series of actions to get approval. Change set by the client or a team member will be proposed to all team members and supervisor for further discussion. If all approve of the suggested or proposed change, then the plan will be modified accordingly, after documenting the change.

9 Plan Approvals

Next, Table 9.1, identifies the plan approvers that should approve of new proposed changes.

Name	Signature	Date
Dr. Sunday O. Olatunji		
Mahi Kamaleldin		
Areej Abed		
Atheer Alshiak Hussain		
Heba Mutawi		
Nadeen Alamoudi		
Zainab Ali Alabbad		

Table 9.1 The Plan Approvers