Requirements Analysis and Design

COMP 3059 – Capstone 1

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1.0 Introduction

1.1 Purpose

The purpose of the Software Requirements Specification is to outline the requirements for the Contactless Restaurant Management Service (CRMS). This document looks to define the purpose and the scope of the service for the users. It will move on to give a system overview and discuss any general constraints that will impact the manner in which the system will be specified, designed, implemented or tested. This document will include the use cases of the service and the functional requirements. The functional requirements analysis will include the inputs, processing and outputs of each of the features. Different diagrams will be included to aid in the implementation of the service. The diagrams that will be included are the Normalized Data Model Diagram, Activity Diagram, Sequence Diagram, UML Class Diagram and Data Flow diagram. The document will conclude with a discussion of the non-functional requirements on a system-wide level and the logical database requirements. The intended audience of this document are the stakeholders and developers of the system.

1.2 Scope

The CRMS is a service that looks to provide a solution to the restaurant industry in dealing with the current pandemic. This is service will be provide through two different products, a mobile application and a web dashboard. This service will minimize the contact between restaurant customers and staff, while increasing the efficiency of the operations. It will efficiency by allowing customers to make reservations and order off their phone when they get to their tables. This will decrease waiting times for customers to start dining and increase the amount of the customers the restaurant can service in a day. The mobile app will provide the customers with reviews from other customers that have been to that restaurant. The service will facilitate communication with the customer and restaurant staff for ordering food and resolving any conflicts. The service will allow the users to pay through their phones for their food and be emailed a receipt upon a successful transaction. The service will provide restaurant owners with data reports about the customers dining behavior at their restaurants.

2.0 System Overview

2.1 Project Perspective

The service we are providing is a new self-contained system. There are current competitors in the field but we are targeting a niche segment of the market. This service is for small restaurants that do not have the resources to implement their own management system. This service is light weight that does not require a large amount of infrastructure to get started. The mobile app can be downloaded from the app store and the web application is downloadable from our website.
It provides the restaurant with a solution to combat the financial difficulties that has been brought on by the current health crisis.

2.2 System Context

This product seeks to be a solution for restaurants that have been financially stagnated by the policies put in place to counter COVID-19. This service will allow restaurants to keep their doors open while abiding by these policies.

2.3 General Constraints

2.3.1 Money

- Features added to application will be limited to monetary compensations.
- Budget restrictions dependent on sponsorship

2.3.2 Time

- Features added to applications will be limited to delivery date required by client.

2.3.3 Scope

- Features are relative to the scope expected by client.

2.4 Assumptions and Dependencies

2.4.1 Assumption

- All resources required will be available.
- Team members possess all the required skills.
- The project scope will not change once finalized.
- Workstations are available
- System pre-configured with software and programs
- CI/CD technology available
- All equipment is in good condition
- Communication is concrete and clear between all stakeholders

2.4.2 Dependencies

Internal	External
Communication between team members	Tools/Libraries Availabilities
Local System Availability	Stakeholders/End Users
Knowledge/Training of New Technologies	

3.0 Functional Requirements

MOBILE APP

3.1.1 - Search Restaurant

Use Case Name	Search Restaurant
Trigger	The User opens the application.
Precondition	None
Basic Path	1. The User chooses how to search for a restaurant. The options are by name or by category 2. If the search is by name, the user types the name of the restaurant they are looking for. 3. The system creates and displays a list of all restaurants relevant to what the User has searched 4. The User selects the restaurant they want to view and the system displays the information of the selected restaurant

Alternative Paths	In step 2, if the User selects to search by category, the system creates and presents a list of all categories in the database. 3. The User selects a category. 4. The system creates and presents a list of all restaurants in that category in the database. Return to step 4 in the basic path
Postcondition	Information about selected restaurant is displayed to user
Exception Paths	The User may abandon the search at any time.
Other	1. The categories of restaurant is based the food they serve and the type of restaurant they are. 2. Information about restaurant such as location, reviews, menu are displayed 3. User needs to be logged in to access this use case

3.1.2 - Make new reservation

Use Case Name	Make new reservation
Trigger	The User selects make new reservation
Precondition	The User is logged in and on the restaurant information page of the restaurant at which they wish to make a reservation
Basic Path	1. The system displays the reservation page to user 2. The User enters reservation information and selects confirm reservation 3. The system checks that the required fields are not blank and updates the database
Alternative Paths	In step 2, if any required field is blank, the User is prompted to fill out the field.
Postcondition	User receives confirmation message and E-mail
Exception Paths	The User may abandon the operation at any time.
Other	1. Reservation information includes date and time. 2. This use case is an extension of use case *3.1.1 Search restaurant*

3.1.3 - View receipts

Use Case Name	View receipts
Trigger	The User selects view receipts
Precondition	The User is logged in and on the home page of the application
Basic Path	1. The system retrieves the receipts of the user from the database and displays it to user
Alternative Paths	none
Postcondition	User can view their receipts

Exception Paths	If the user has no receipts, the use case is abandoned and appropriate message is shown to the user
Other	1. The receipts include information such as amount paid, date and the items ordered

3.1.4 - Register

Use Case Name	Register
Trigger	The User selects register
Precondition	None
Basic Path	1. The system displays the register page to user 2. The User Enters registration information 3. The User selects create account 4. The system checks if user is already registered and if all required fields are filled. 5. The system adds user to the database and sends verification E-mail to use user 6. The User verifies their account
Alternative Paths	In step 4, If the User is already registered, an appropriate message is displayed and are prompted to log in In step 4, If the User leaves a required field empty, they are prompted to fill out all required fields
Postcondition	User is registered
Exception Paths	The user may abandon the operation at any time
Other	Registration information includes information about user such as their First Name, Last Name, Username, Password, E-mail, Phone and optional fields such as Preferences and a Profile picture

3.1.5 - Login

Use Case Name	Login
Trigger	The User selects login
Precondition	The User is registered in the system and opens the application
Basic Path	1. The system displays the login page to user 2. The User Enters login information 3. The User selects login button. 4. The system checks if login information is valid and required fields are filled. 5. The system redirects user to the application home page
Alternative Paths	In step 4, if the User enters invalid login information, they are prompted to enter valid login information
Postcondition	User is logged in and home page is displayed

Exception Paths	The user may abandon the operation at any time
Other	Login information includes username and password

3.1.6 - Make a review

Use Case Name	Make a review
Trigger	The User selects Make a review
Precondition	The User is logged in and on the page of the restaurant that they wish to make a review for.
Basic Path	1. The system displays Make a review page to User 2. The User enters review information 3. The User selects Add review 4. The system saves the review and database is updated
Alternative Paths	None
Postcondition	Confirmation message saying review was added is displayed
Exception Paths	The user may abandon the operation at any time
Other	1. Review information includes a rating our of five stars and an optional field describing the review

3.1.7 - Make payment / Pay bill

Use Case Name	Make payment / Pay bill
Trigger	The User selects Pay bill
Precondition	The User is signed into restaurant through NFC and has completed orders
Basic Path	1. The system displays Payment page to user 2. The User enters their payment information and selects Confirm payment 3. The system calculates the bill and payment is processed through third party application 4. The system processes the payment response and stores the receipt in the database
Alternative Paths	In step 4, if the payment response is invalid, the system redirects user to payment page and appropriate message is displayed If the user doesn't have any completed orders, appropriate message is displayed and they are re-directed to home page
Postcondition	Payment confirmation message and receipt is displayed to User
Exception Paths	The user may abandon the operation at any time
Other	1. Payment information includes card number, expiry date and type of card. 2. Payments will be processed using stripe API.

	3. This Use case is only applicable when the User is present at the restaurant and signed in through NFC

3.1.8 - Make table request

Use Case Name	Make table request
Trigger	The User selects make table request
Precondition	The User is signed into restaurant through NFC
Basic Path	1. The system prompts user to confirm table request 2. The system adds the table request to queue and sends a notification to restaurant 3. The restaurant staff marks the table request as completed
Alternative Paths	None/
Postcondition	Table request confirmation notification is sent to user
Exception Paths	None.
Other	1. This Use case is only applicable when the User is present at the restaurant and signed in through NFC

3.1.9 - Make order

Use Case Name	Make order
Trigger	The User selects order food
Precondition	The User is signed into restaurant through NFC
Basic Path	1. The system displays the restaurant menu 2. The User selects items of the menu and selects proceed with order 3. The system displays order summary to User 4. The User confirms order 5. The system stores the order, adds it to the bill and sends a notification to the restaurant
Alternative Paths	In step 4, if the user decides to not confirm their order, they are redirected to step 2
Postcondition	Order confirmation message is displayed to User
Exception Paths	The user may abandon the operation at any time
Other	1. This Use case is only applicable when the User is present at the restaurant and signed in through NFC 2. Order summary includes all the items ordered and their total price

3.1.10 - View reservations

Use Case Name	View reservations
Trigger	The User selects view reservations
Precondition	The User is at the home page of the application and is logged in.
Basic Path	The system displays the reservations of the user
Alternative Paths	None.
Postcondition	The User can view their reservations
Exception Paths	None.
Other	None

3.1.11 - Edit reservation

Use Case Name	Update reservation
Trigger	The User chooses a reservation and selects Edit reservation.
Precondition	The User is at the view reservations page of the application and logged in.
Basic Path	1. The system displays updateable reservation information to user 2. The User updates reservation Information and selects confirm changes 3. The system updates the reservation in database and sends E-mail to user regarding the update
Alternative Paths	None.
Postcondition	User receives E-mail and confirmation message is displayed
Exception Paths	The user may abandon the operation at any time
Other	1. This use case is an extension of use case *3.1.10 View reservations*

3.1.12 - Delete reservation

Use Case Name	Update reservation
Trigger	The User chooses a reservation and selects Delete reservation
Precondition	The User is logged in and is at the view reservations page of the application
Basic Path	1. The User confirms reservation cancellation 2. The system deletes the reservation in database and sends E-mail to user regarding the cancellation
Alternative Paths	None.
Postcondition	User receives cancellation E-mail and confirmation message is displayed
Exception Paths	The user may abandon the operation at any time
Other	1. This use case is an extension of use case *3.1.10 View reservations*

3.1.13 - Update profile

Use Case Name	Update profile
Trigger	The User selects View profile
Precondition	The User is logged in and is at the home page of the application
Basic Path	1. The system displays Profile page 2. The User selects update profile 3. The system displays an updateable profile page 4. The User updates their profile information and is requested to confirm the changes 5. The user confirms the changes 6. The system updates the User's information in the database
Alternative Paths	None.
Postcondition	Updated profile page is displayed to the User
Exception Paths	None,
Other	1. Updateable profile page displays user information such as First Name, Last Name, Username, Password, E-mail, Phone and optional fields such as Preferences and a Profile picture in updateable input fields

RESTAURANT WEB APP

3.1.14 - Login

Use Case Name	Login
Trigger	The Restaurant staff / admin selects login
Precondition	The Restaurant staff / admin is registered in the system and opens the application
Basic Path	1. The system displays the login page to Restaurant staff / admin 2. The Restaurant staff / admin Enters login information 3. The Restaurant staff / admin selects login button. 4. The system checks if login information is valid, required fields are filled. 5. The system checks the role of Restaurant staff /admin 6. The system redirects Restaurant staff /admin to the application dashboard.
Alternative Paths	In step 4, if the Restaurant staff / admin enters invalid login information, they are prompted to enter valid login information In step 5, if the role is admin, they are redirected to admin dashboard in step 6.

	In step 5, if the role is staff, they are redirected to staff dashboard in step 6
Postcondition	Restaurant staff / admin is logged in and dashboard is displayed
Exception Paths	The Restaurant staff / admin may abandon the operation at any time
Other	Login information includes username and password

3.1.15 - View monthly reports

Use Case Name	View monthly reports
Trigger	The Restaurant admin selects view monthly reports
Precondition	The Restaurant admin is logged in to the admin dashboard of the application
Basic Path	1. The system displays the months for which monthly reports are available 2. The Restaurant admin selects the month for which the report should be generated 3. The system generates the monthly report.
Alternative Paths	None
Postcondition	Selected monthly report is displayed to Restaurant admin
Exception Paths	The Restaurant admin may abandon the operation at any time
Other	1. This use case is only accessible by the admin of the restaurant 2. The monthly report includes customer dining patterns.

3.1.16 - View payments

Use Case Name	View payments
Trigger	The Restaurant staff / admin selects View payments
Precondition	The Restaurant staff / admin is on the staff/admin dashboard of the application and is logged in.
Basic Path	The system displays the payments
Alternative Paths	None
Postcondition	Payments made to restaurant are displayed to Restaurant staff/admin
Exception Paths	The Restaurant staff / admin may abandon the operation at any time
Other	None

3.1.17 - View customer data visualizations

Use Case Name	View customer data visualizations
Trigger	The Restaurant admin selects View customer visualizations
Precondition	The Restaurant admin is logged in to the admin dashboard of the application
Basic Path	1. The Restaurant admin selects the days for which the visualizations will be displayed 2. The system retrieves customer data and generates the visualizations.
Alternative Paths	None
Postcondition	Customer data visualizations for the selected days are displayed to Restaurant admin
Exception Paths	The Restaurant admin may abandon the operation at any time
Other	1. This use case is only accessible by the admin of the restaurant 2. The visualizations include graphs about customer behaviour and spending.

3.1.18 - Update menu

Use Case Name	View customer data visualizations
Trigger	The Restaurant admin selects View menu
Precondition	The Restaurant admin is on the admin dashboard of the application and logged in.
Basic Path	1. The system displays the menu of the restaurant to the Restaurant admin 2. The Restaurant admin selects update menu 3. The system displays an updateable menu to the Restaurant admin 4. The Restaurant admin make the changes to the menu and confirms the changes 5. The system updates the menu in the database
Alternative Paths	None
Postcondition	Menu is updated and displayed to the Restaurant admin
Exception Paths	The Restaurant admin may abandon the operation at any time
Other	1. This use case is only accessible by the admin of the restaurant

3.1.19 - View orders

Use Case Name	View orders
Trigger	The Restaurant staff / admin selects View orders

Precondition	The Restaurant staff / admin is on the staff/admin dashboard of the application and logged in.
Basic Path	1. The system displays two options to the Restaurant staff / admin - view completed orders or pending orders 2. The Restaurant staff / admin selects view completed orders 3. The system gets completed orders from database and displays them to user
Alternative Paths	If the Restaurant staff / admin selects view pending orders in step 2 then 3. The system gets pending orders from database and displays them to user
Postcondition	Completed / pending orders are displayed to Restaurant staff/admin
Exception Paths	The Restaurant staff / admin may abandon the operation at any time
Other	1. Only orders completed on the same day are shown to the Restaurant staff / admin 2. Completed / pending orders are displayed with the items included in the order.

3.1.20 - Change pending order to complete

Use Case Name	Mark pending orders as complete
Trigger	The Restaurant staff / admin selects an order and selects complete order
Precondition	The Restaurant staff / admin is on the view pending orders page of the application
Basic Path	The system changes the status of the order
Alternative Paths	None
Postcondition	Updated completed orders list is displayed to Restaurant staff/admin
Exception Paths	The Restaurant staff / admin may abandon the operation at any time
Other	1. The restaurant staff / admin needs to be logged in to access this use case 2. This use case is an extension of the alternative path of the use case *3.1.19 View orders*

3.1.21 - View reservations

Use Case Name	View reservations

Trigger	The Restaurant staff / admin selects View reservations.
Precondition	The Restaurant staff / admin is on the staff / admin dashboard of the application and is logged in.
Basic Path	The system displays all reservations to the Restaurant staff / admin
Alternative Paths	None.
Postcondition	Reservations are displayed to Restaurant staff/admin
Exception Paths	The Restaurant staff / admin may abandon the operation at any time
Other	1. Only reservations booked for the same day are displayed 2. Reservations are displayed with the time and name of the customer who made the reservation

3.1.22 - Cancel reservation

Use Case Name	Cancel reservation
Trigger	The Restaurant staff / admin selects cancel reservation
Precondition	The Restaurant staff / admin is on the view reservations page of the application and selects a reservation. The user is logged in.
Basic Path	1. The Restaurant staff / admin confirms the cancellation 2. The system deletes the reservation from database 3. The system sends a notification and E-mail to customer regarding the cancellation
Alternative Paths	None
Postcondition	Reservation deletion confirmation displayed to Restaurant staff/admin
Exception Paths	The Restaurant staff / admin may abandon the operation at any time
Other	1. This use case is an extension of use case *3.1.21 View reservations*

3.1.23 - View restaurant staff

Use Case Name	View restaurant staff
Trigger	The Restaurant admin selects View restaurant staff
Precondition	The Restaurant admin is logged in and on the admin dashboard of the application
Basic Path	The system displays all the staff of the restaurant that are registered
Alternative Paths	None.
Postcondition	All the staff of the restaurant are displayed to Restaurant staff/admin

Exception Paths	The Restaurant admin may abandon the operation at any time
Other	1. This use case is only accessible by the Restaurant admin 2. The staff are displayed with their name, phone and E-mail.

3.1.24 - Delete restaurant staff

Use Case Name	Delete restaurant staff
Trigger	The Restaurant admin selects delete staff
Precondition	The Restaurant admin is on the View restaurant staff page and selects a particular staff member. The admin is logged in.
Basic Path	1. The restaurant admin confirms the deletion of the staff member 2. The system deletes the staff member from the database
Alternative Paths	None.
Postcondition	Staff deletion confirmation is displayed to the Restaurant admin
Exception Paths	The Restaurant admin may abandon the operation at any time
Other	1. This use case is an extension of use case *3.1.23 View restaurant staff*

3.1.25 - Add restaurant staff

Use Case Name	Add restaurant staff
Trigger	The Restaurant admin selects Add staff
Precondition	The Restaurant admin is on the View restaurant staff page and is logged in.
Basic Path	1. The system displays the enter staff information page 2. The restaurant admin enters the staff information and confirms addition 3. The system checks if all the required input fields have been inputted 4. The system adds the staff member to the database
Alternative Paths	In step 3, if any required field is blank then the Restaurant admin is prompted to enter the correct information
Postcondition	Staff addition confirmation is displayed to the Restaurant admin
Exception Paths	The Restaurant admin may abandon the operation at any time
Other	1. This use case is only accessible by the restaurant admin *2.* This use case is an extension of use case *3.1.23 View restaurant staff* 3. Staff information includes first name, last name, phone, E-Mail.

3.1.26 - Update restaurant staff

Use Case Name	Add restaurant staff
Trigger	The Restaurant admin selects Update staff
Precondition	The Restaurant admin is on the View restaurant staff page and selects a particular staff member. The admin is logged in.
Basic Path	1. The system displays an updateable staff information page 2. The restaurant admin updates the staff information and confirms the changes 3. The system checks if all the required input fields have been inputted 4. The system updates the staff member information in the database
Alternative Paths	In step 3, if any required field is blank then the Restaurant admin is prompted to enter the correct information
Postcondition	Staff updated confirmation is displayed to the Restaurant admin
Exception Paths	The Restaurant admin may abandon the operation at any time
Other	1. This use case is only accessible by the restaurant admin *2.* This use case is an extension of use case *3.1.24 View restaurant staff* 3. Staff information such as first name, last name, phone, E-mail are displayed as updateable fields

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3.2 Use Cases

3.2.1 Use Case #1 ...

3.3 Data Modelling and Analysis

3.3.1 Normalized Data Model Diagram

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3.3.2 Activity Diagrams

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3.3.3 Sequence Diagrams

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3.3.4 UML Class Diagram

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3.4 Process Modelling

3.4.1 Data Flow Diagram

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4.0 Non-Functional Requirements

- Application will seek to have a response time of 0.7 seconds
- Database server should allow for 1000 queries/minute
- Application must encrypt passwords before storing to database
- Application must provide third-party services to ensure payment information is kept private and confidential
- User must setup recovery email address/phone number
- Application downtime is projected to allow for 10 minutes/year
- Limit rows fetched and displayed from database to 6 for queries returning more than one row
- Mobile application should be cross-platform, offer services to at least android and iOS

5.0 Logical Database Requirements

We will be using MongoDB. Due to the nature of our applications, we are not required to construct complex queries. As a result, the use of a NoSQL and SQL database will both produce a time complexity of $\Theta(n)$.

Because we will be using utilizing JSON, the data formats are simply objects containing key-value pairs consisting of numbers, strings or an array of the two.

Because we will not be paying for any extra storage capabilities with MongoDB, we will be limited to 5GB of storage.

Data retention will be heavily dependent on our clients and the amount of funding we receive. Ideally, we'd have none of our data deleted provided we have funding for storage. Otherwise, what we'd implement is after 30 days, we'd export all our data and store is separately on the cloud to ensure enough space is available in our database.

To maintain data integrity, we will be using utilizing MongoDB's mirrored database option. Mirrored databases ensure that data in both copies are consistent.

6.0 Other Requirements

We will be using React Native to implement our mobile application and utilizing the MERN stack to implement the web application.

7.0 Approval

Project Role	Name	Signature	Date
Team Member	Saif Bakhtaria	Saif Bakhtaria	November 15, 2020
Team Member	Shelton Dmello	Shelton Dmello	November 15, 2020

Team Member	Min Lin	Min Lin	November 15, 2020
Team Member	Syed Sabih Jamal	Syed Sabih Jamal	November 15, 2020
Team Member	Janit Sriganeshaelankovan	Janit Sriganeshaelankovan	November 15, 2020