Software Requirement Specifications and Design

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1. Introduction

1.1 Purpose

The main purpose of this document is to provide a list of requirements for a finished product, along with constraints of its operation and development. This document will act as a reference point for the work to be achieved. Additionally, designs are included for the introductory purpose of illustrating project structure.

1.2 Scope

The software product to be produced is a website and a mobile application.

Website Scope:
- Does not require user accounts
- Displaying a food menu
- Is likely shown on a mobile device
- Prompting the user that our app is available for download

App Scope:
- Requires user accounts
- Scanning of a QR code
- Displaying AR model of item or YouTube video
- Displaying previous user reviews
- Prompting the user to review the food item they ate

1.3 Definitions and Acronyms

QR Code (Quick Response Code): the proprietary name of a matrix barcode that is read by photographing it with the camera of a smartphone or other mobile device that is equipped with a 2D barcode reader.[1]

AR (Augmented Reality): an enhanced image or environment as viewed on a screen or other display, produced by overlaying computer-generated images, sounds, or other data on a real-world environment.[2]

1.4 Overview

As stated in the purpose of this document, basic requirements and designs are laid out within. For easy reference of various portions of the contents, a synopsis is provided as follows.

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[1] Source: https://www.dictionary.com/browse/qr-code. Accessed Jan. 22, 2021.
[2] Source: https://www.dictionary.com/browse/augmented-reality. Accessed Jan. 22, 2021.

Section 2 contains an overall description of this project, providing our view of the user's needs, and project assumptions and dependencies. Section 3 consists of a list of questions the stakeholder was asked, along with the answers to these questions. Many user stories can be found in Section 4, and lastly, Section 5 and all its subsections contains all the many designs for the reader to interpret as project structure. Section 5 is where a bulk of information can be retrieved when attempting to understand our goals.

2. Overall Description

This product and its requirements are affected by change in the restaurant industry and consumer practices. Our product primarily hinges on the use of cellular devices.

2.1 User Needs

Customers want to know what the prepared foods are like as it will help them make a better decision. Prior to this, waiters would describe the dishes to new customers so they can assist with the decision, however especially with the COVID-19 pandemic, an adjustment towards less contact can be a welcome one. Now, the customer is encouraged to scan a QR code with their mobile device, where they will be shown an AR model or YouTube video, in addition to previous customer reviews. To further reduce physical contact and lessen the need to download an app, a website will also be provided

2.2 Assumptions and Dependencies

- Customers will need internet access for large portions of usage.
- For AR Compatibility:
  - Android users should be running Android 8.1 or higher.
  - Apple users should be running iOS 11.0 or higher and have an A9 or successive processor.
- Mobile devices must have a camera.
- Battery of the device must be substantial.
- Mobile devices must have a sufficient amount of processing power and RAM.

3. Stakeholder Q&A

1. Do we need to include a description, pricing, and/or options for each food item AR model?
    - If so, will this be part of the AR visualization?
    - Price separate from AR (to not put customer off)
    - Also up to us if we want it part of app (it's on the menu already)

2. Will our app need to be able to operate offline?
   - Restaurant will most likely have wifi
   - Up to us, but not a great feature

3. Are we storing the models, or will the restaurant need to store them? If we are storing the models, then are we required to make/gather them, or will the restaurant supply it?
   - We can ask a restaurant to make for them particular for it or make it generic so we change little bit for any restaurant
     - If generic, make sure you can demo it, i.e. example menu, a real restaurant

4. Does the app need to be downloaded from the app/play store? Could we make it a PWA (progressive web app)? (An app which can run on a browser, and have the ability to be installed as an app on a mobile device)
   - It's good to have webapp + mob app
   - Up to us

5. Do we need to have login/accounts functionality?
   - Own authentication system or use google/facebook's
   - Google and facebook provide extra information about the user.

6. Do we need a blank or real-time AR background?
   - 3D model with camera

7. How many AR dishes and restaurants were we supposed to have?
   - This question will influence the selection of our type of database.
   - Upto 250 dishes. On average restaurants have 10-20 dishes.

8. Can we develop this app to function for a single restaurant or do we need to be able to support many different restaurants
   - Generify it and then customize for restaurants later

9. Are we aiming for simple UI (one button operations) or complex UI (multi screen app)?
   - Simple

10. Multiple color schemes (dark/light themes)?
    - Up to us

11. What type of user reviews are we taking?
    - Thumbs Up/down, star-based rating system, comments, emoji etc?
        - Star Rating and commenting
        - Some people only rate and some also leave a comment too.

12. Do we show other user reviews/comments about the dish at the bottom of the AR?
    - Yes
    - Stars and how many people rated it.

13. Should we add the functionality of letting the restaurant add new dishes?
    - Will restaurants have a different login system compared to the customers?
    - Yes

14. Do we need to adapt to COVID-19? If yes, our idea is as follows.
    - Users will be presented with 2 options. Scan QR code or View Menu.
    - Scan QR: Scan QR on the physical menu and see the AR model.
    - View Menu: Users will see the full menu of the restaurant, with the name of the dish, description, price and a small QR code next to it. Tapping the QR code will simply present the AR model.
    - This can be done but difficult and up to us

15. Do we need to add a 'contact us, about us, startup screen with our logo' page?
    - Not important but should be done.
    - Restaurant's contact info on the menu.

16. What other functionalities would you want in the app?
    - Scanning QR Code can bring up a virtual menu
    - Scanning QR code on the physical menu brings AR models or youtube video.

17. Should the customer be able to review only after receiving the notification or at any time?

- They can review whenever they want.

4. User Stories

Priority: High
As a restaurant, I want the customer to be able to use the app whether they have an Android mobile device or iOS.
Board Item: https://trello.com/c/UeS0e2WI/29-android-and-ios

Priority: High
As a restaurant, I want the customer to see the food as an AR model or YouTube video on their mobile device so that it gives them an idea of what they're getting.
Scenario: Show the customer an AR model or YouTube video of the food they want. Given: The customer has their mobile phone with them. When: The customer scans/clicks a QR code which can be found on the restaurant's physical/digital menu. Then: They will be provided with an AR model or YouTube video of the food they are interested in picking. *Board Item:* https://trello.com/c/hIMBjyBq/12-display-3d-model-in-ar

Priority: Medium
As a customer, I need to be asked after about an hour or two to leave reviews on the item(s) I had left a like on or viewed while browsing the menu.
Scenario: Asking the customer if they want to leave a review on the dish they had left a like on or viewed recently. Given: The customer selected the "Like" option or viewed at least one menu item. When: 60-120 minutes after leaving the first like or first view on a menu item.

Then: A push notification is sent to the customer requesting if they wish to leave a comment on the menu item(s) they had liked or seen earlier.

Board Item: https://trello.com/c/O0RFGLJG/8-send-a-push-notification-for-leave-a-review

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Priority: Medium

As a customer, I want the ability to leave a like on the AR model I am currently viewing.

Scenario: Customer wants to leave a like on the dish they're viewing.

Given: They are looking at the AR model for a food item on the app.

When: The customer likes the way a food looks and click the like button.

Then: It will be stored on the user's device that they like this dish.

Board Item: https://trello.com/c/VwBwAs6P/7-like-dislike-system

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Priority: Medium

As a customer, I want to view the 3D AR model by tapping the 'QR code icon' on the menu, in the event where I am unable to scan the QR code from a physical menu.

Scenario: View the 3D AR model for a menu item from the digital menu within the app.

Given: The customer can view the digital menu.

When: The customer does not want to or is unable to scan the QR code.

Then: The 3D AR model will be displayed to the user after tapping the 'QR code icon' from the digital menu.

Board Item: https://trello.com/c/hIR5NhOt/11-view-ar-model-from-the-digital-menu

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Priority: Medium

As a customer, I should be able to read the reviews left by other customers.

Scenario: A customer wants to read the comments on the dish whose 3D model is currently

present on the screen.

Given: A customer decides to see the comments.

When: The customer taps the 'read comment' button at the bottom right corner of the screen.

Then: All the comments left by other users will show on the screen.

And: Comments will display the username of the customer.

Board Item: https://trello.com/c/rgx4ICkw/1-ability-to-read-reviews

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Priority: Medium

As a customer, I need to be asked after about an hour or two to leave reviews on the item(s) I had left a like on while browsing the menu, and be able to submit a review.

Scenario: Asking the customer if they want to leave a review on the dish they had left a like on.

Given: The customer selected the "Like" option on at least one menu item.

When: 60-120 minutes after leaving the first like on a menu item.

Then: A push notification is sent to the customer requesting if they wish to leave a comment on the menu item(s) they had liked earlier.

And: Users will choose the dish they wish to leave a comment on. There will be 3 options associated with each dish: "Like", "Dislike", "Submit".

And: The "Like" option will be selected by default because the dish was already liked by the customer. Customers can dislike the dish if they aren't satisfied with the dish.

Board Item: https://trello.com/c/4NP2xMaP/14-adding-comments

Priority: Medium

As a restaurant owner, I want the ability to customize my menu.

Scenario: Customize a restaurant menu.
Given: The owner is logged in.
When: The owner modifies the menu items by adding or removing.
Then: Changes will take place in the database reflecting these changes.

Board Item: https://trello.com/c/b44HKNeW/15-add-remove-edit-menu-item

Priority: Low

As a product owner, I want to see the startup screen with the app's logo so that I can confirm app startup.

Scenario: Startup screen when app is loading
Given: The user has installed the app.
When: The user is launching the app.
Then: The user can see the startup screen.

Board Item: https://trello.com/c/XiNFik2Q/2-startup-screen-with-apps-logo

Priority: Low

As a user/restaurant owner, I want the ability to switch between light and dark themes.

Scenario: Providing a light and dark theme.
Given: A user wants to change the theme of an app already open on their device.
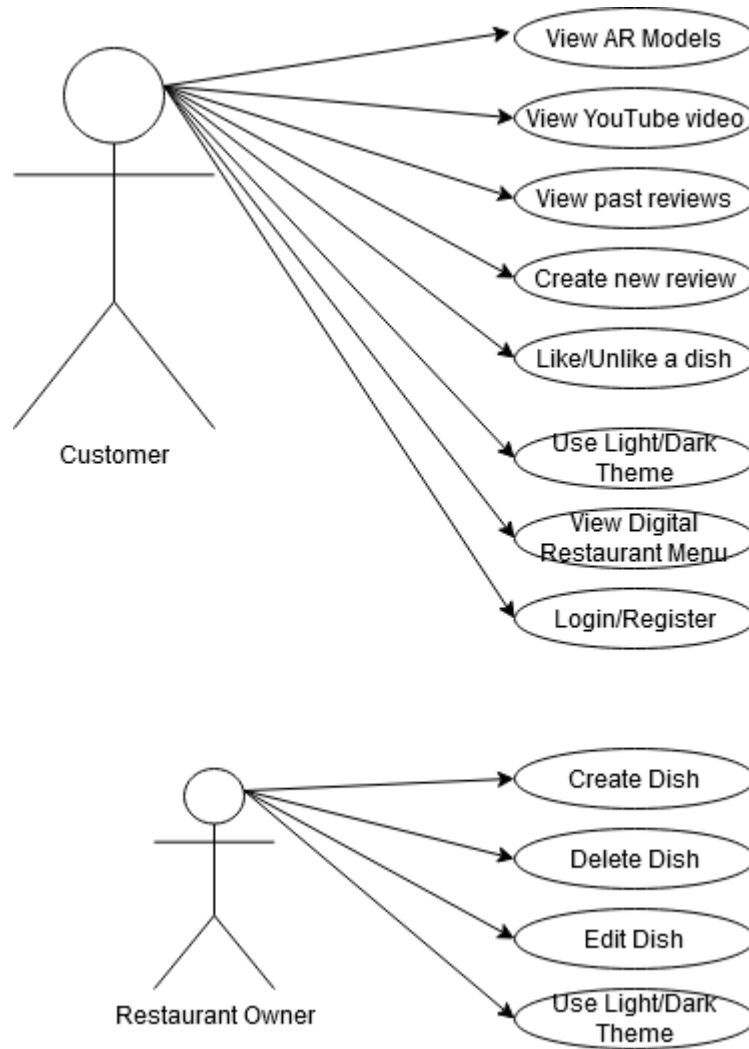When: Users click the 'change theme' button.
Then: The app's current theme will switch between light and dark.

Board Item: https://trello.com/c/NVOhaBlr/6-multiple-ui-themes

5. Diagrams

5.1 Use Case

Customer: View AR Models	
Actors	Customer
Description	A customer requests for an AR model by scanning a QR code, and that model should be transferred to the mobile device of the customer and displayed.
Data	3D AR model.
Stimulus	A food item's QR code was scanned which links to an AR model.
Response	Displaying of an AR model.
Comments	There must be a valid internet connection for this process to work. Customer does not need to be signed into the application. This cannot occur at the same time as a customer viewing a YouTube video. Notification queue must be updated here as the customer needs to be notified about submitting a review in the future.

Customer: View YouTube Video	
Actors	Customer
Description	A customer may request for a YouTube video by scanning a QR code, and that video should be loaded up for them to watch.
Data	A YouTube video.
Stimulus	Food item QR code scanned.
Response	A food item's QR code was scanned which links to a YouTube video.
Comments	There must be a valid internet connection for this process to work. Customer does not need to be signed into the application. This cannot occur at the same time as a customer viewing an AR model. Notification queue must be updated here as the customer needs to be notified about submitting a review in the future.

Customer: View Past Reviews	
Actors	Customer

Description	A customer may request to view reviews that past customers have left. This will give them information about whether the food they're interested in is up to their standards.
Data	Review information (Ratings and Comments).
Stimulus	Food item QR code scanned and gesture made to view reviews.
Response	Displaying of review information.
Comments	There must be a valid internet connection for this process to work. Customer does not need to be signed into the application.

Customer: Create New Review After Notification	
Actors	Customer
Description	A customer may choose to leave a review on a food item they chose after eating it. This gives information to future customers and the restaurant owner about how good that particular food is.
Data	Review information (Ratings and Comment).
Stimulus	Opening application after receiving notification about submitting a review.
Response	The customer should fill out the form and submit it, whereby changes will be reflected in the database.
Comments	There must be a valid internet connection for this process to work. Customer does need to be signed into the application.

Customer: Create New Review After Selecting Food Item	
Actors	Customer
Description	A customer may choose to leave a review on a food item they chose at any period in time, and they should be able to.
Data	Review information (Ratings and Comment).
Stimulus	Selecting a food item on virtual menu or by scanning its QR code.
Response	The customer should fill out the form and submit it, whereby changes will be reflected in the database.

Comments	There must be a valid internet connection for this process to work. Customer does need to be signed into the application.

Customer: Like/Unlike a Dish	
Actors	Customer
Description	A customer may choose like a dish or unlike an already liked dish. Liking acts as a 'favourites' system, where it will keep track of the customer's food items they think they will like the most.
Data	Like food items.
Stimulus	Clicking the like button when already scanned a food item QR code, or clicking the unlike button.
Response	If the like button was clicked, then the scanned food item will be added to likes, and if the unlike button was clicked then it will be removed.
Comments	Internet connection is not needed to like/unlike as this information is kept on the device. However, it is required for scanning a food item QR code, which is a prerequisite for this activity.

Customer/Restaurant Owner: Use Light/Dark Theme	
Actors	Customer/Restaurant Owner
Description	A customer or restaurant owner may choose whether they prefer to use a dark or light theme of our application, effectively changing visual styles but not functionality.
Data	None.
Stimulus	Clicking the light/dark mode button.
Response	If the user is already in light mode and they click the button, the application switches into dark mode, otherwise they switch into light mode.
Comments	Internet connection is not needed for this, and the display preference should be stored for future application launches.

Customer: View Digital Restaurant Menu	
Actors	Customer

Description	A customer decides to view a digital version of the menu instead of a physical one, and so they should be provided with one that is accurate and displays well for mobile devices.
Data	Restaurant's menu food items.
Stimulus	Scanning a QR code with their camera application on their phone.
Response	They should be linked to the website which displays the full menu.
Comments	Internet connection is needed to access the website. The mobile application is not required for this use case.

Customer: Login/Register	
Actors	Customer
Description	A customer needs to be able to authenticate themselves in order to submit a review, and logging in becomes a part of this process.
Data	Account information.
Stimulus	After receiving a notification to review a food item, upon launching the app and if they are not already logged in.
Response	The customer must authenticate themselves out of one of a variety of options, such as for example Facebook, Google, Apple, etc.
Comments	Internet connection is required for this case. Additionally, the examples listed in the response section are not guaranteed for addition, and are only included for description.

Restaurant Owner: Create Dish	
Actors	Restaurant Owner
Description	A restaurant owner needs the ability to create dishes so that customers can view and review it.
Data	Dish information.
Stimulus	Submitting new dish information through a respective form.
Response	Database reflects the creation of a new dish as was filled out in the form.
Comments	Internet connection is required for this case.

Restaurant Owner: Delete Dish	
Actors	Restaurant Owner
Description	A restaurant owner needs the ability to delete a dish if it is no longer required to be displayed or if it's not offered anymore.
Data	Dish information.
Stimulus	Clicking the delete button next to a food item.
Response	The dish gets deleted from the database, along with any reviews attached to that dish.
Comments	Internet connection is required for this case.

Restaurant Owner: Edit Dish	
Actors	Restaurant Owner
Description	A restaurant owner needs the ability to edit a dish if any information on it is incorrect, or more needs to be added.
Data	Dish information.
Stimulus	Submitting an update form to dish.
Response	The dish's values are updated in the database.
Comments	Internet connection is required for this case.

5.2 Overview Sequence Diagrams

ItemView

Scanning QR Code

```
Customer        ScanningView        Camera      Database      ItemView

   Open QR Scanning
   ───────────────▶

                    request access
                    ──────────────▶

┌─── alt ─ [permissions] ───────────────────────────────┐
│                   grant access                        │
│                   ◀─ ─ ─ ─ ─ ─ ─ ─                     │
│                   reject access                       │
│                   ◀─ ─ ─ ─ ─ ─ ─ ─                     │
│   no camera access                                    │
│   ◀─ ─ ─ ─ ─ ─ ─ ─                                     │
└───────────────────────────────────────────────────────┘

   ┌─── loop ──────────────────────────────────┐
   │              onBarCodeScanned()            │
   │                   ◀──┐                     │
   │   ┌──────────┐       │                     │
   │   │ QR code is│       │                     │
   │   │ decoded   │       │                     │
   │   └──────────┘                             │
   └────────────────────────────────────────────┘

              fetchLinkFromDB()
                   ◀──┐

                       authenticate
                   ──────────────────────▶

┌─── alt ─ [granted access] ────────────────────────────┐
│                   granted                             │
│                   ◀─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─            │
│              getItemLink(ItemID)                       │
│                   ──────────────────────▶             │
│                   ItemLink                            │
│                   ◀─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─            │
├ ─ ─ ─ ─ [no access] ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┤
│                   rejected                            │
│                   ◀─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─            │
│          Error                                        │
│   ◀─ ─ ─ ─ ─ ─ ─ ─                                     │
└───────────────────────────────────────────────────────┘

   ┌──────────────┐
   │ Either AR model│
   │ or YouTube video│
   │ link is fetched here│
   └──────────────┘

              displayItem(ItemLink,ItemID)
   ──────────────────────────────────────────────────▶
```
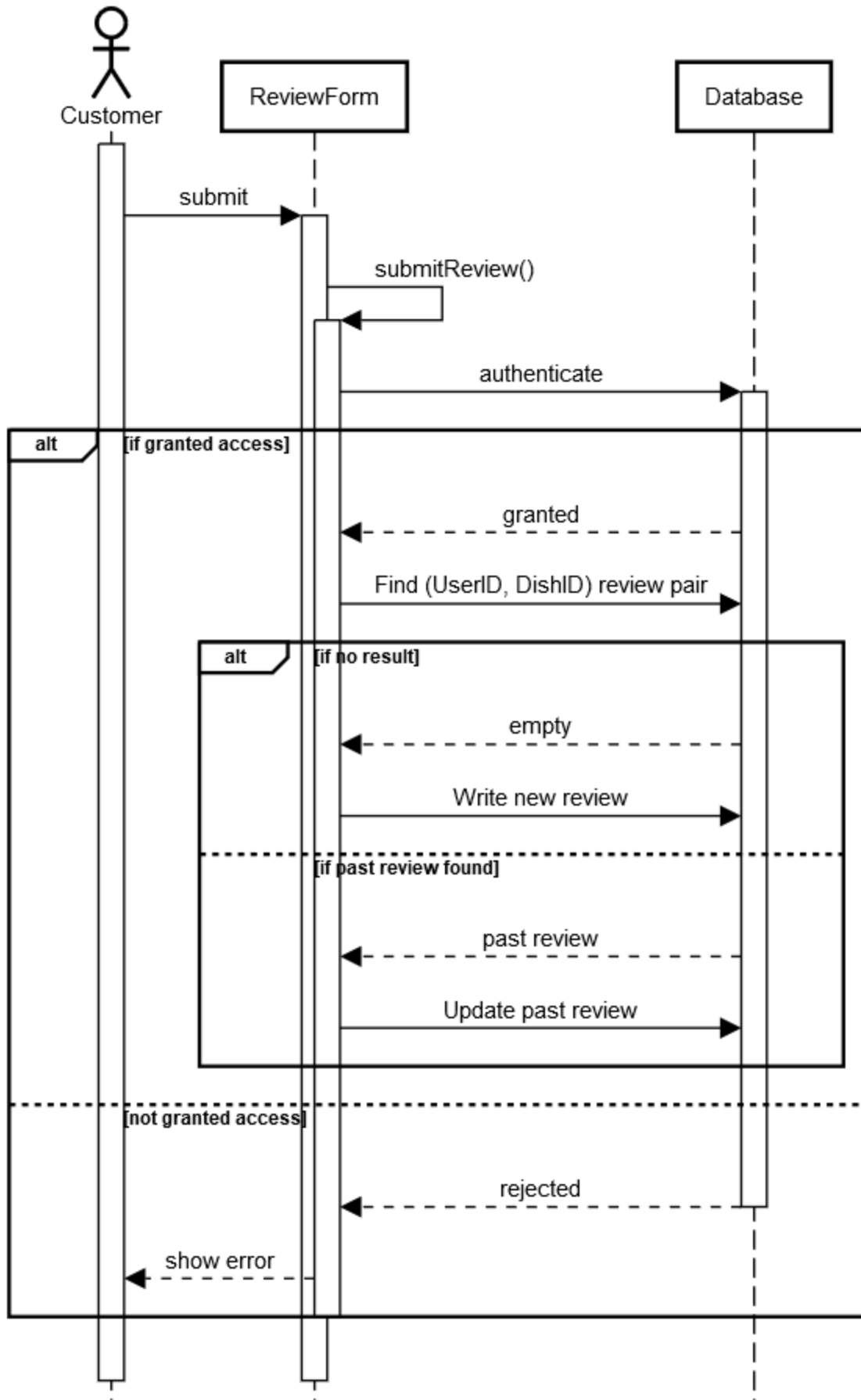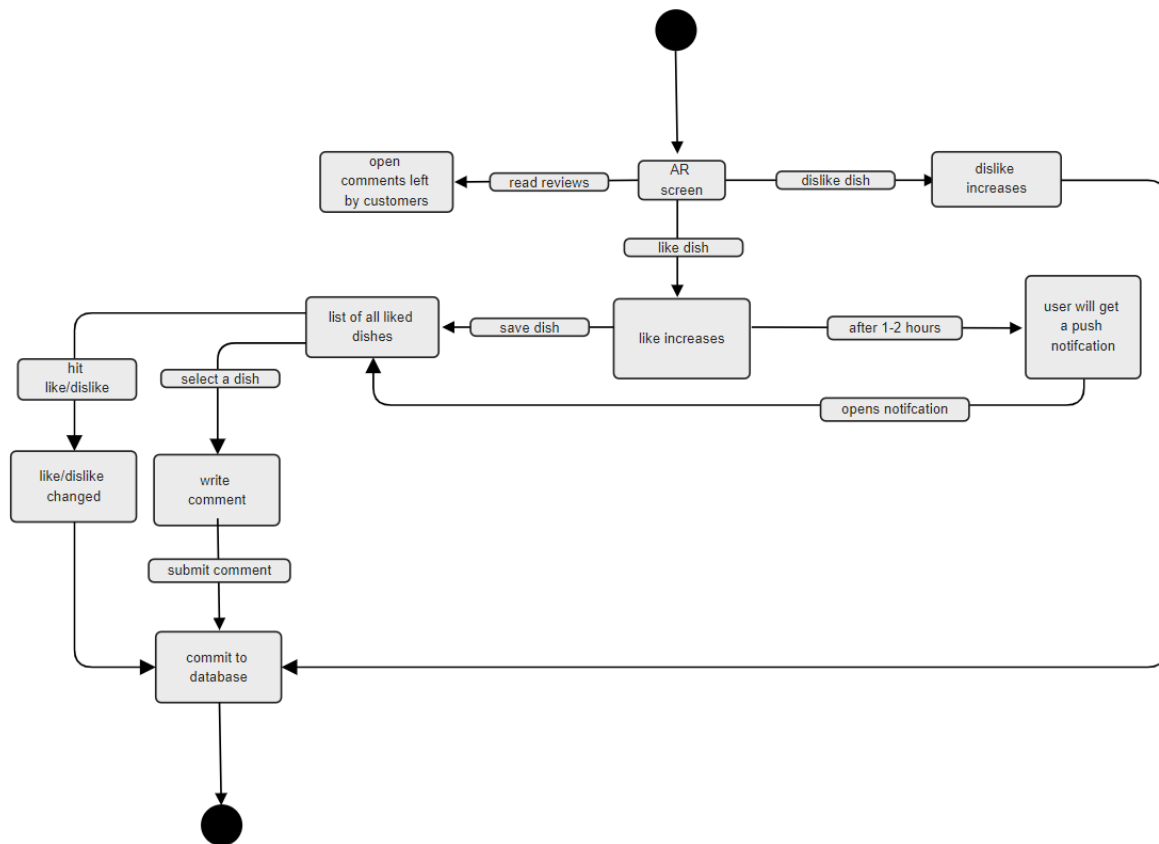
18

ReviewForm

- Customer
- ReviewForm
- Database

submit

submitReview()

authenticate

alt [if granted access]

granted

Find (UserID, DishID) review pair

alt [if no result]

empty

Write new review

[if past review found]

past review

Update past review

[not granted access]

rejected

show error
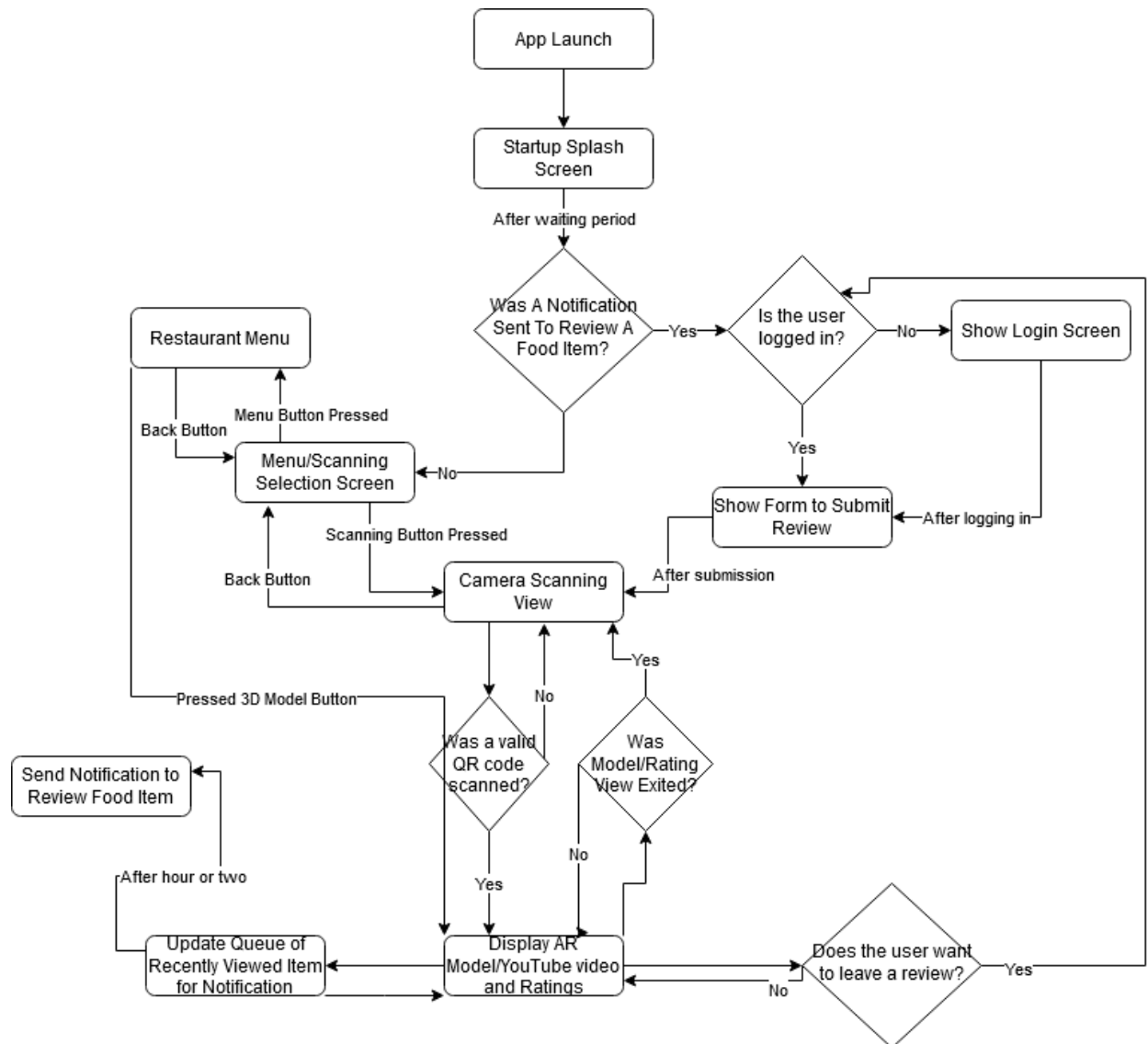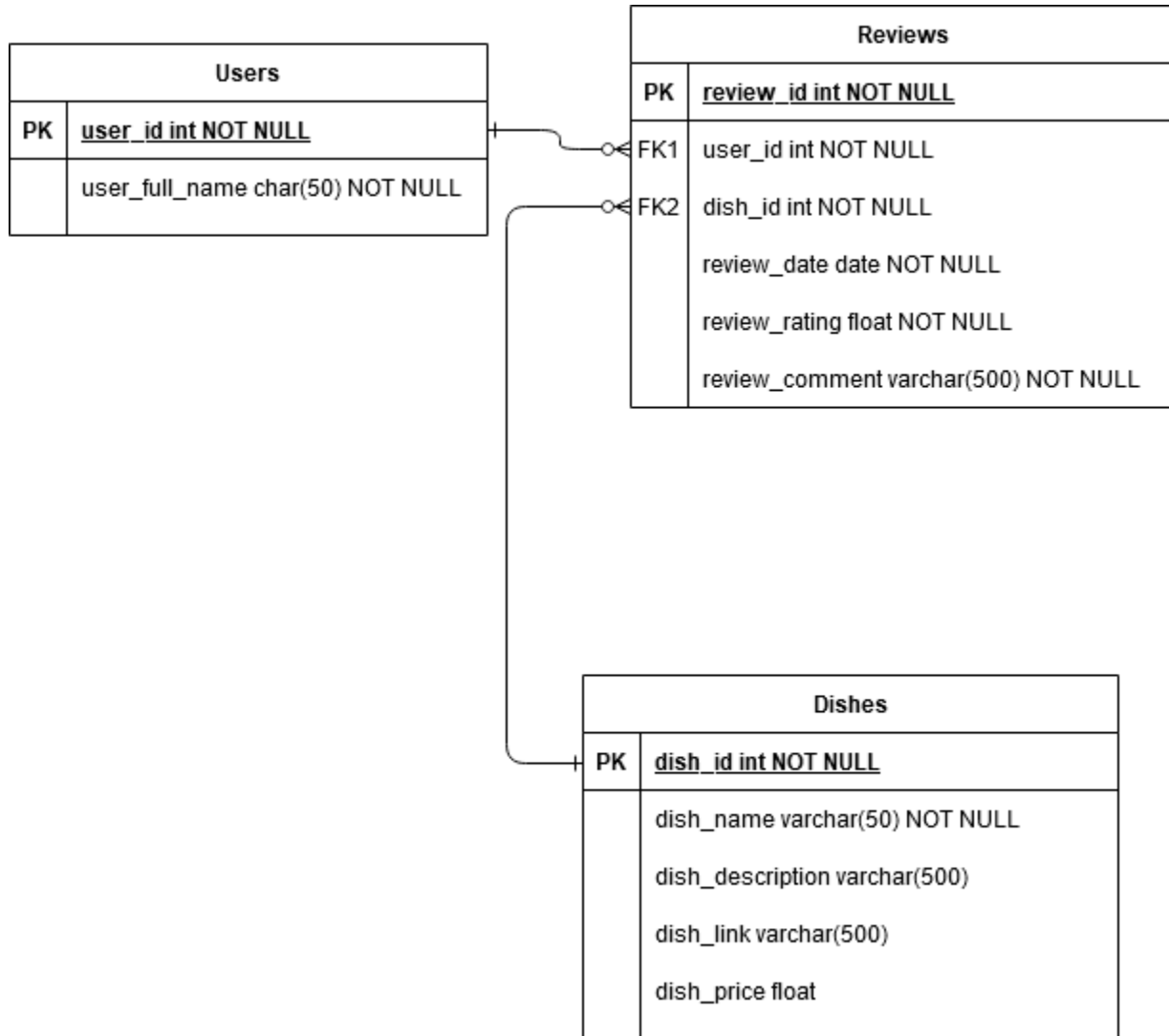
19

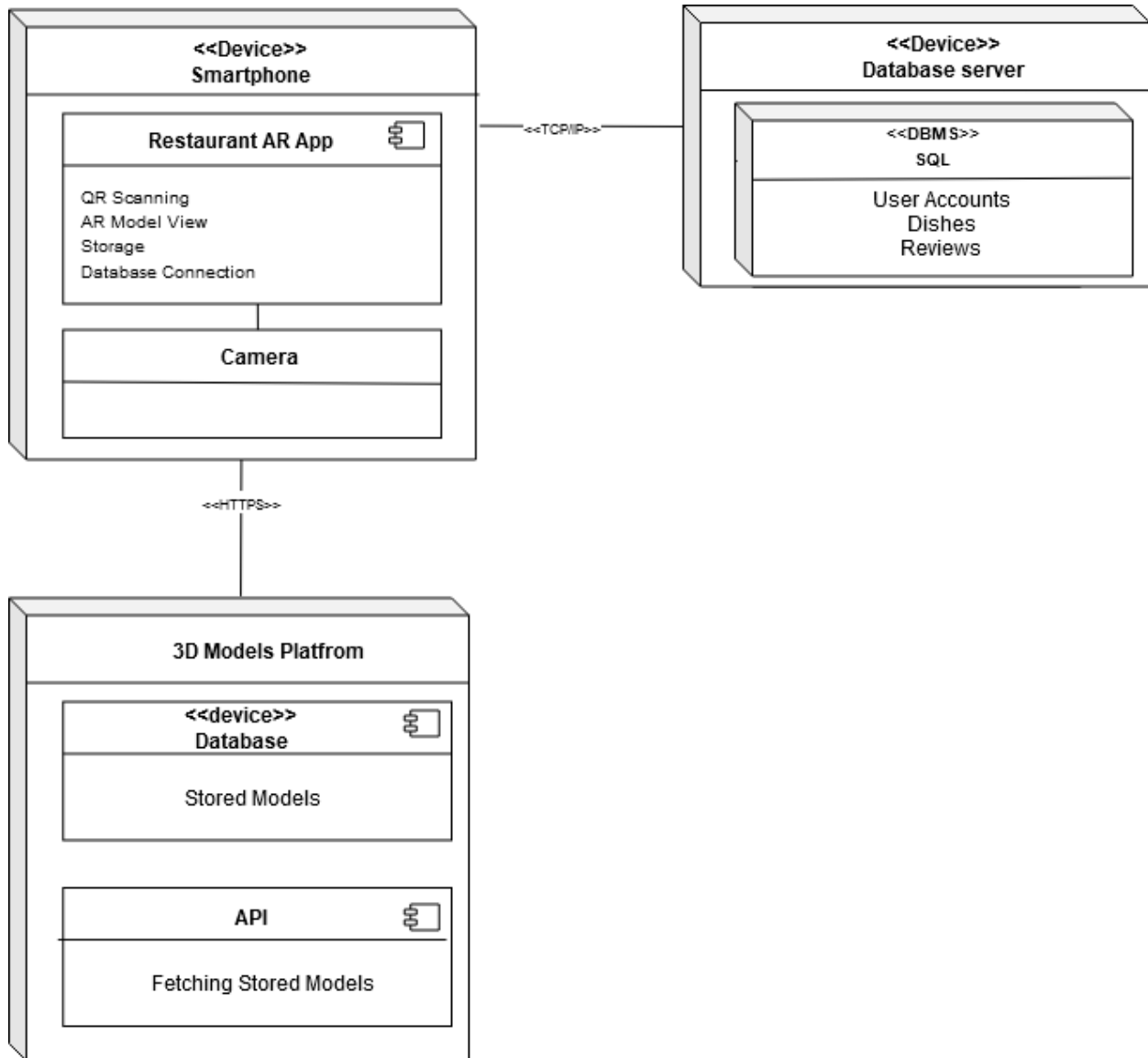# 5.3 State

5.4 Mobile Application Execution Flow

The execution flow of the application is meant to be generic as it gives an overview of what should be expected throughout execution given the events that occurred beforehand. To the viewer, it brings an illustration of various views and screens that are displayed, along with some functionality if the user decides to make an action.

5.5 Database

Users

PK	user_id int NOT NULL
	user_full_name char(50) NOT NULL

Reviews

PK	review_id int NOT NULL
FK1	user_id int NOT NULL
FK2	dish_id int NOT NULL
	review_date date NOT NULL
	review_rating float NOT NULL
	review_comment varchar(500) NOT NULL

Dishes

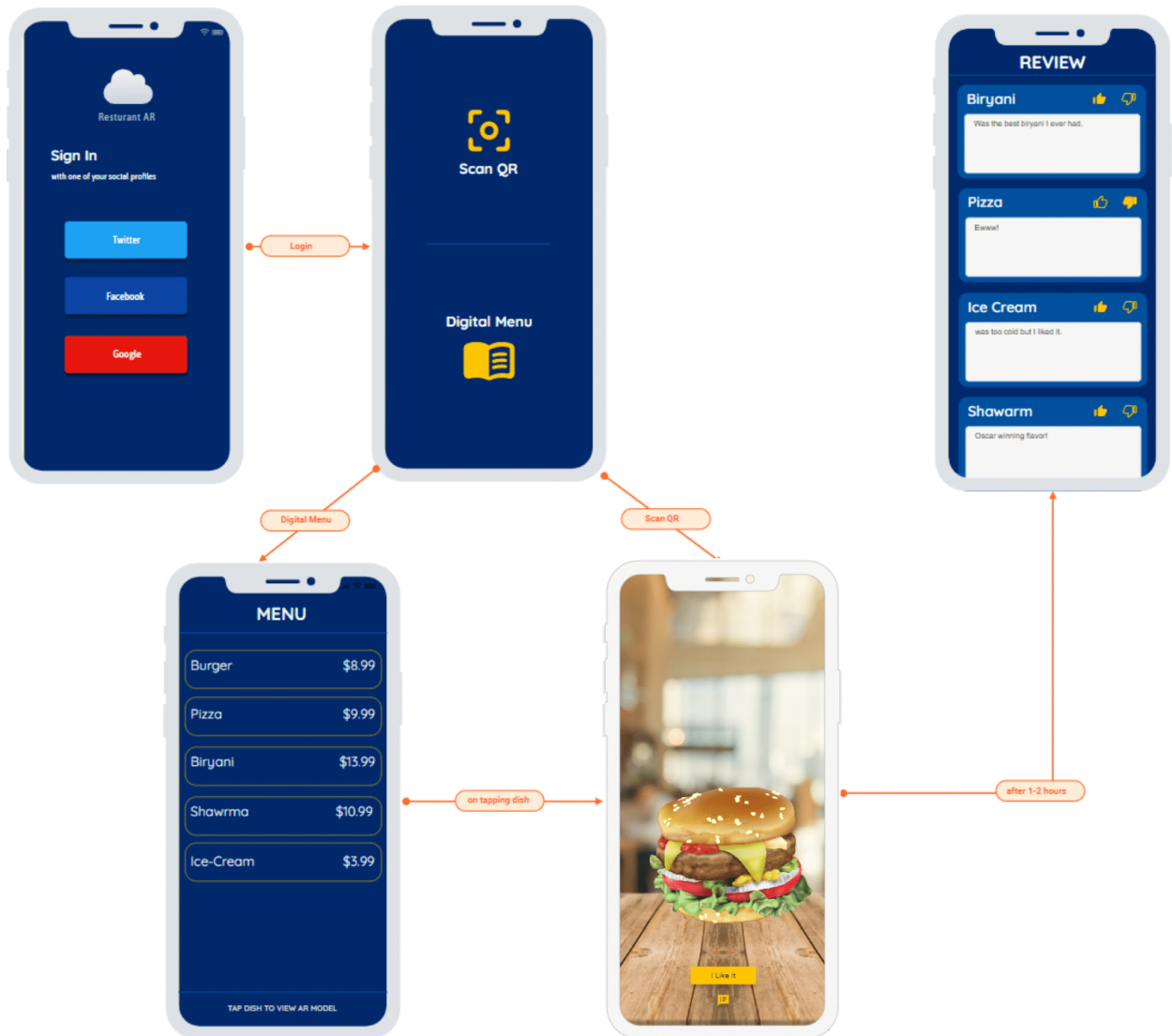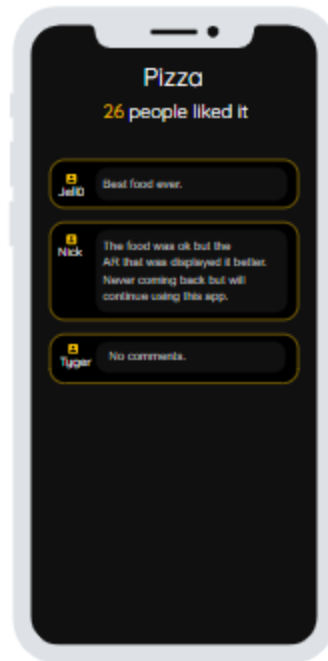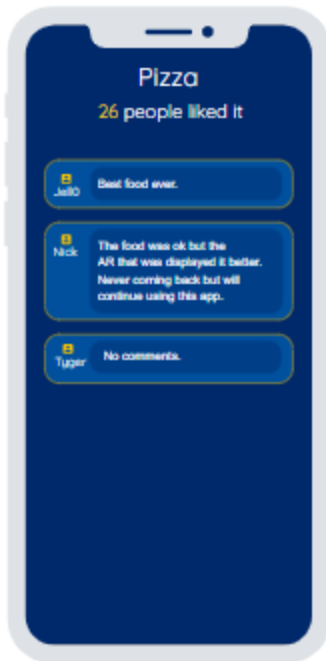| PK	dish_id int NOT NULL
	dish_name varchar(50) NOT NULL
	dish_description varchar(500)
	dish_link varchar(500)
	dish_price float

5.6 Deployment

The mobile application is targeted for use on smartphones and will require the use of a camera which is connected to the device. Additionally, to store the reviews, user data, and restaurant dishes, a database server will be required, where the mobile application will connect to this database to obtain, create, or update entries. Lastly, an API will be used from a platform that has the 3D models already stored. This will save the need to store the same model twice which reduces redundancy.

5.7 Multiple UI Designs & Theme Color Palette

Sign In
with one of your social profiles

Resturant AR

- Twitter
- Facebook
- Google

Login →

Scan QR

Digital Menu

REVIEW

Biryani 👍 👎
Was the best biryani I ever had.

Pizza 👍 👎
Ewww!

Ice Cream 👍 👎
was too cold but I liked it.

Shawarm 👍 👎
Oscar winning flavor!

Digital Menu

Scan QR

MENU

Burger	$8.99
Pizza	$9.99
Biryani	$13.99
Shawrma	$10.99
Ice-Cream	$3.99

TAP DISH TO VIEW AR MODEL

on tapping dish

I Like It

after 1-2 hours

Color 1		Color 2		Color 3		Color 4		Color 5	
HEX	00296B	HEX	003F88	HEX	00509D	HEX	FDC500	HEX	FFD500
RGB	0, 41, 107	RGB	0, 63, 136	RGB	0, 80, 157	RGB	253, 197, 0	RGB	255, 213, 0
HSB	217, 100, 42	HSB	212, 100, 53	HSB	209, 100, 62	HSB	47, 100, 99	HSB	50, 100, 100
CMYK	100, 61, 0, 58	CMYK	100, 53, 0, 46	CMYK	100, 49, 0, 38	CMYK	0, 22, 100, 0	CMYK	0, 16, 100, 0

Default Color Scheme

coolors

Color 1		Color 2		Color 3		Color 4		Color 5	
HEX	000000	HEX	101010	HEX	444444	HEX	B8B8B8	HEX	FCC500
RGB	0, 0, 0	RGB	16, 16, 16	RGB	68, 68, 68	RGB	184, 184, 184	RGB	252, 197, 0
HSB	0, 0, 0	HSB	0, 0, 6	HSB	0, 0, 27	HSB	0, 0, 72	HSB	47, 100, 99
CMYK	0, 0, 0, 100	CMYK	0, 0, 0, 93	CMYK	0, 0, 0, 73	CMYK	0, 0, 0, 27	CMYK	0, 21, 100, 1

Dark Theme

coolors
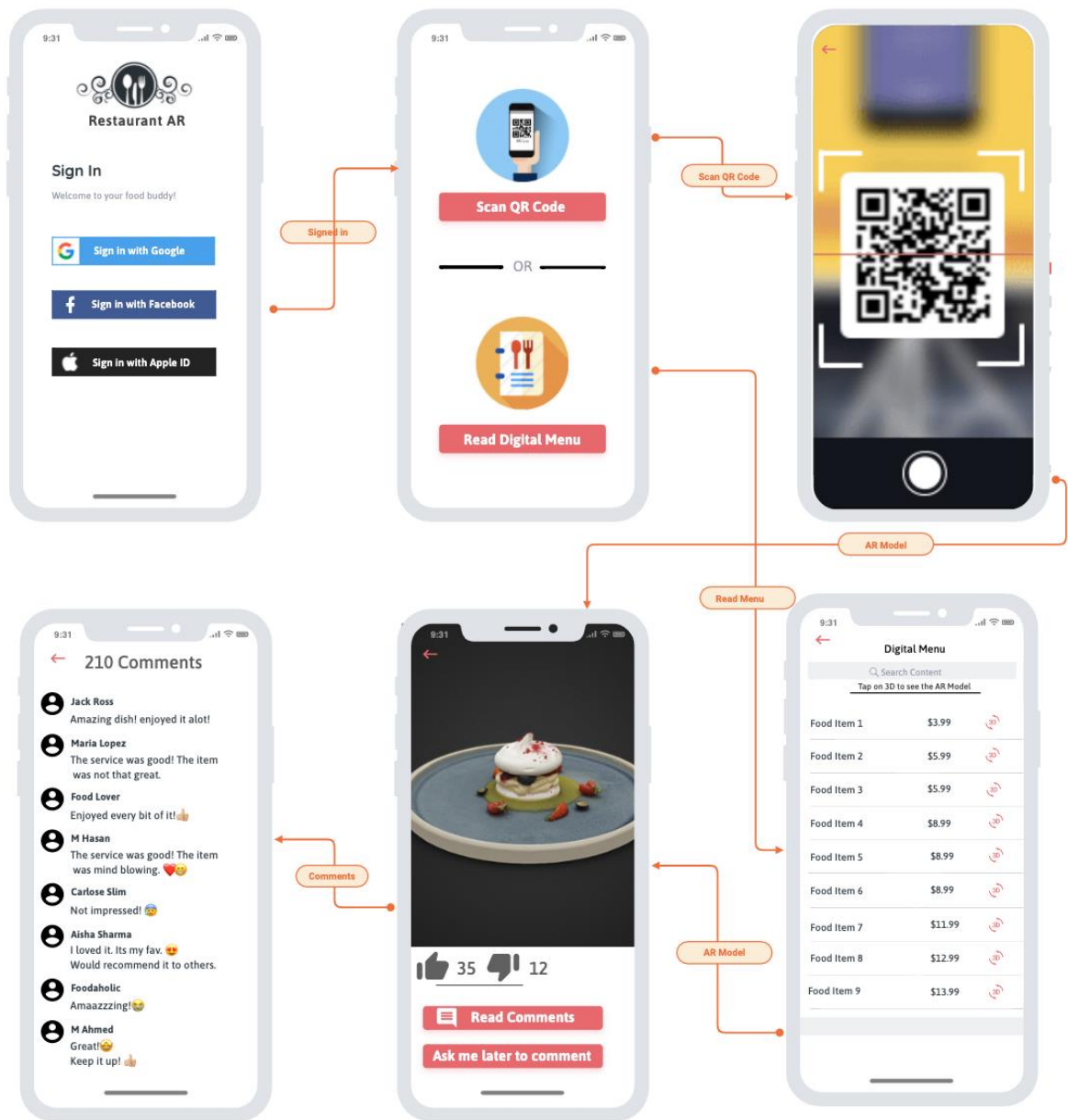
6. Project Tasks

Tasks are managed here:
https://trello.com/restaurantar