



Report 1 : Restaurant Automation

Food•E•Z (<https://sites.google.com/site/sefoodez/home>)

Group #3

Leader: Omar El Warraky

Julian Esteban

Jonathan Du

Sujay Bandarpalle

Paolo Umali

Kanav Tahilramani

All members contributed equally!

Table of Contents

1.Customer Statement of Requirements.....	4
1.1 Down Time	4
1.2 Wasted time trying to handle customers' transactions.....	6
1.3 Dissatisfaction due to wait time.....	7
1.4 Managing Profit and loss	7
1.5 Down Time	8
2.Glossary of terms.....	11
2.1 Technical Terms.....	11
2.2 Non-Technical Terms.....	11
3.User Stories.....	13
3.1 Manager	14
3.2 Chef.....	15
3.3 Busboy.....	15
3.4 Waiter/Waitress	16
3.5 Bartender.....	17
3.6 Takeout Cashier	17
3.7 Customer.....	18
3.8 General Employee.....	18
4.Functional Requirements Specification.....	20
4.1 StakeHolders	20
4.2 Actors and Goals.....	20
4.3 Use Cases.....	22
i) Casual Descriptions	22
ii) Use Case Diagram.....	22
iii) Traceability Matrix.....	23

iv) Fully Dressed Descriptions.....	25
5.User Interface Specification.....	42
5.1 Preliminary Design	42
5.2 User Effort Estimation.....	46
6.Domain Analysis.....	47
6.1 Domain Model.....	47
i) Concept Definitions	47
ii) Association Definitions.....	49
iii) Attribute Definitions.....	50
iv) Traceability Matrix.....	53
v) Domain Model Diagram.....	54
6.2 System Contracts.....	55
6.3 Mathematical Model.....	57
7.Plan of Work.....	61
8.References.....	64

Customer Statement of Requirements:

The world is coming to an era of technology. Our restaurant is undergoing a renovation to implement technology into our stores. We have a deal made with Microsoft to implement tables and hand held tablets with top notch surfaces using the new Windows environment. We'd like to have a special app to be able to interact with our new windows environment. Below is a couple of problems we would like to be solved in this app that we can't find anywhere else.

Problem: Down Time Associated with Checking in on the Reservation List and Order Preparation Progress

In the restaurant industry, time is money. The amount of time it takes to serve customers determines the amount of groups served each day, which will determine the revenue generated from sales and tips. In order to cut down on time, we have come up with a few features that will remove the need for waiters to have to manually check in on reservation list at the front entrance as well as the kitchen. In addition, by walking around the restaurant more, a waiter exposes themselves to opportunities to be asked to for service from other customers, which will increase the amount of time between when orders are ready and when they are delivered, which increases the time that the table is occupied by the current party.

In order to solve this we came up with several features. This includes table availability schedule, the order progress queue, and the chef hotline.

Table Availability Schedule:

When customers walk in they are greeted by a tablet, in which they are asked to input their name and party size. This information is then sent back to our database, which utilizes an algorithm that assigns a table to each customer. This algorithm first uses party size to prioritize customers for each table. It does this by checking if any tables are available that can hold the specified party size. If no table is available, then the next largest party is prioritized, and so on.

When the party size prioritization part of the algorithm has ended, the next part consists of prioritizing by time. Here the algorithm checks through the available tables and if several party sizes match the specifications of an available table, then the party who arrived first is given the priority of being seated at

the table. The algorithm then proceeds to do this for the rest of the customers waiting to be seated as tables become available/unavailable.

At the end of our algorithm, the tablet at the front of the restaurant displays the name of the customer and shows a diagram of the restaurant with the table they are assigned highlighted. The customer is prompted to confirm that they have received the notification and will proceed to the table. This information is also updated for the waiters so that they know if one of their tables has recently been taken or if no confirmation has been made by the customer for a while, then to go to the front of the restaurant and manually look for the customer. This algorithm should also be made in a way that it will rotate the customers around the store. For example a medium sized store would be split into 4 with 4 waiters. Thus when giving the first customer a table it will send him to section 1 and then the next to section 2 giving this the ability to spread the customers around the store making the availability of waiters to a maximum and speeding up all processes at dining peak.

As the customer finishes dinner a tablet will be available for him to pay for his dinner. This payment process indicates that this table needs to be cleaned which will light up automatically on the application for waiters to know what tables need to be cleaned. When the table is cleaned the waiter will have to process this manually by a simple touch of a button letting the system know the table is ready to serve new customers.

Order Progress Queue:

The order progress queue will be a way for the waiters and chefs to have a synchronized electronic list of order progress and availability. It will consist of a database that stores meals. When a waiter places an order for a group, all of the meals will be put on the end of the queue in the database. Both the chef and the waiter can see the queue. The chef will be able to click on an meal, and have the option to select one of three statuses: stopped, in progress, or complete. The queue will also show how long it has been since the meal was started, so the waiter can estimate the time to completion. When the chef sets a meal's status to complete, it will send an alert to the waiter that placed the meal order so they know it is ready for pick-up.

Our queue will also be able to list orders for take-out, and will designate which meals are to be placed at the take-out window or the waiter pick-up window upon completion. Priority for which meal is to be

prepped is assessed by the order in which they are placed, regardless of whether the meal is for take-out or dine-in.

Problem: Wasted time trying to handle customers' transactions

Many restaurant dwellers arrive at a restaurant with an empty stomach, ready to be seated and ready to devour anything in their path. Once seated, customers begin their watches, timing customer service and the time it takes for food to come out. As a restaurant employee, it is our job to ensure high-end customer service and minimize the time taken for food reach the customer. The problem at hand is time: time it takes for servers to take orders, place orders to the chefs, and bring out the food. With so much time wasted, customers will be seated longer and arriving guests will have to wait longer to be seated. To maximize profit and keep customers wanting to come back, we have come up with solutions that will speed up the guest visit.

Create a functional menu to effectively maximize profit and raise customer satisfaction

At restaurants like Applebee's or TGI Fridays, hosts/ess seat guests and hand each guest a menu. Once they have decided, servers take their orders and walk to the kitchen to give chefs the orders. Once orders are completed, servers come to the "ready area" and look for the orders to bring to hungry customers. While this is extremely time consuming, our restaurant automation application can significantly speed up the entire process and maximize customer satisfaction and restaurant profit.

With our restaurant automation application, we have a functional menu that servers can reference and will be able to place orders that will be sent directly to the chefs without having to walk to the kitchen to hand them orders. Having this functional menu will significantly speed up the time it takes for orders to travel from customer to server to chef. Once orders are completed by chefs, servers will be notified via our restaurant automation application. Having been notified by the chef that orders are completed, servers will not waste time checking up on orders and can designate more time tending to customers; tending to customer needs instead of constantly checking if an order is complete will raise customer satisfaction. The waiters will be holding the tablets for taking the orders so waiters can always give their personal opinion, customers usually like that. We would also like to have a personal app customers can order and it will show up that this customer has placed an order on the system himself so the waiter

wouldn't have to go over to them. All in all, speeding up the process at which customers place orders and receive food will significantly reduce the time customers occupy a table; thus, allowing more guests to be seated and maximizing profit.

Problem: Dissatisfaction and unhappiness with regards to the wait time for paying the bill

Imagine that you and a group of friends are customers at a restaurant and you are all ready to pay the bill. You call over the server, but the server is waiting on another table. Five minutes pass by. The server finally comes and you tell the server that you are ready to pay. Another five minutes pass by where the server has to calculate the total cost of your meal. He hands you the check, but you wanted the bill split amongst you and the rest of your group. Another five minutes pass where the server has to recalculate the bill and split amongst all of you. Finally, you decide to pay with a credit card and another five minutes pass where he has to run to the swipe machine and process the bill. The overall process for paying the bill took twenty minutes. In that twenty minutes, another group of customers could have been seated, placed their orders, and possibly begun eating. Whether its splitting the bill or having multiple frustrating interactions with your server, paying the bill has always been a long and tiring process at restaurants.

With our restaurant automation application, we can significantly speed up the process of paying the bill. Once a server has placed an order, the order automatically gets placed in the corresponding table's bill. Furthermore, the application will keep track of what orders correspond to which guest within each table. Having the order kept in our database, we will eliminate the use of pencil and paper and the possibility of miscalculations on the bill (since our application will conduct all the arithmetic from the bill). If the server requests to split the bill, our application will prompt the server with the question "how many people would you like to split the bill amongst?". The app should be able to make a personal check for each of the customers on the table if they wish so. All of these features within the bill payment interface will eliminate the time it takes for servers to calculate the bill and significantly reduce the time needed for customers to pay the bill.

With less time required to handle transactions, more time can be allocated to seating and assisting new guests. Not only will we maximize profit, but speeding up the process of paying means customers will leave the restaurant with a smile and wanting to come back.

Problem of managing Profit/Loss statements efficiently and quickly:

Nowadays finding a complete system that deals with everything is becoming difficult. Managers want to see their profits and losses whenever they need it on a monthly basis to make sure everything is going well. Making a P/L calculator on an application will prove to be an essential use to the Manager as he will easily keep progress of what is occurring in terms of finance for his store wherever he is. Managers have many tedious things they must attend to so putting all finance matters linked directly with customer checks, payrolls and store expenses on the spot will allow the manager to see a budget and control when he needs to take action or make a change on a day to day basis. This also will allow managers to view different profit margins for each store in the future to be able to grasp a general idea of each store's performance. This part of the application will also be able to process the tips separately from the profit and categorize it to each waiter so the manager can know exactly how much tips go to each individual.

Problem of Menu addition and Availability:

Having a part of this application to allow the manager to simply add and remove products off the menu will be very convenient. Managers won't need to buy new menus or update customer menus (takeaway), as for everything will be online and ready to go. We'd like the manager to have the ability to add an item or remove it with ease as well as keep track of the items availability in the kitchen and view how many orders are put on a particular item. Being able to access this from any place including his home or car allows the manager a lot of ease to carry out other tedious manners he needs to attend. Such as meetings or looking at other stores and so on. It also allows in the future managers to contact different stores in the chain and see the differences of Menu formats.

Employee Portal

Managers find trouble seeing employees checking in and out and watching their work schedules and seeing when and where they log in. Checking activity on spot wherever the manager is. Thus we need an Employee Portal.

The employee portal works as a universal scheduling manager and tool for workers at the restaurant. It will be accessible in two ways. Employees can login to the application on a tablet and view a calendar

which shows all available shifts as well as those which they are signed up for. A similar interface will be available through a website as an online web portal.

This functionality enables several options for the staff. It allows them to sign up for future shifts, open a previously taken shift for coverage, and let go of a shift with a provided reason. This is used as opposed to manually taking note of all such information; it automates the documentation and shift management in the backend with minimal input required from employees.

In addition, there is possibility for expansion in that that employees can use either the tablet application or the website to clock their hours. The purpose behind this feature is to assist in automating the weekly paycheck distribution as it stores details pertinent to those calculations, i.e hours worked, sick leave, etc. This information can be used by managers to minimize the amount of time spent on related tasks per pay cycle. Employees also find this a way to feel comfortable around technology. It helps them make sure their hours are all logged in correctly while as to see a clear schedule to their work and those around them.

The scheduler works to keep an organized log of work hours as opposed to keeping track of the shifts by hand, and the purpose behind the clock in/out is to reduce routine tasks and automate menial work that is required frequently. Lastly, the whole portal has added convenience of being accessible in two ways.

Plan of Work and Product Ownership

Within our group of 6 members, we have split into 3 pairs to maximize productivity. The pairs are as follow: Jonathan and Paolo, Julian and Sujay, and Omar and Kanav. Each pair will have specific tasks during the next few weeks that they will contribute. The main objective for the next few weeks will be to create the basis of the restaurant automation application before we branch off into sub-features using Windows.

Jonathan and Paolo: Our plan to accomplish in the next few weeks is to create a layout of the restaurant with tables. Within the layout, we want to add different functionalities which include:

- Create a functional menu for waiters/waitresses to use
 - Create interface for customers' bill (<http://pay.opentable.com/>)
 - Average Tip calculator for Managers to Gauge Waiter Service/Attractiveness
 - Display of common tip denominations in the billing screen in order for a waiter to gauge the satisfaction of each party
-

Julian and Sujay: Our plan to fulfill is to create a login screen that will have different functionalities for different users.

- Speak to the Chef
- Table Availability and Wait Time
- Chef mode = The chef will be able to see the database listing the meals in the order of which they were placed. Upon clicking the meal, it will open up and show the individual items of the meal, along with three buttons that are Stopped, In Progress, and Complete. Shows time since start, estimated time to completion (can go negative which indicates a slower than usual prep time, and a likelihood of the meal finishing). The selection of these buttons will update the meal database queue for the waiter/waitress as well, so that they can see which meals are ready for pickup.

Omar and Kanav:

- Our plan to accomplish in the next few weeks is to design and create a menu that allows waiters/waitresses to place orders that can be directed to chefs.
 - Online employee portal which handles scheduling tasks (add, remove w/ reason, swap, etc)
 - Profit/Loss tracking with database
-

Glossary of Terms:

Technical Terms:

Database: the file where the menu items, inventory, scheduling and orders are stored.

Employee Portal: Schedule accessible by employees that lists their shifts and any open shifts they may cover.

Restaurant Automation: Use of an internal restaurant management application to automate and carry out major operations within a restaurant establishment.

Graphical User Interface (GUI): The interface that allows easier user communication via pictures and texts

Table Availability Schedule: A database that shows the availability of the tables in the restaurant.

Order Progress Queue: A priority queue that shows the progress of each order and what will be prepared first.

Non-Technical Terms:

Foodies: A person who has an ardent or refined interest in food and alcoholic beverages and seeks

Bartender: Serves beverages and maintains the supply and inventory of the bar.

Bill: A statement which contains details of the menu items that have been purchased and the money that is owed for them.

Busboys: Clears tables, takes dirty dishes to the dishwasher, sets tables.

Chef: Responsible for creating and planning menus, overseeing food preparation, and supervising the kitchen staff.

Chef Hotline: The functionality that allows customers to contact the chef from the waiter's tablet to inquire about menu items.

Customer: A person or party who visits the restaurant to dine, and can order food and place reservations from a smartphone or tablet app.

Customer Satisfaction: Measurement of how food preparation, customer service, and overall experience surpasses customer expectation

Dine-in: When a customer would like to eat in the store.

Manager: The person that is responsible for inventory management, employee scheduling, payroll and customer satisfaction.

Menu: A list of dishes from which customers can choose from.

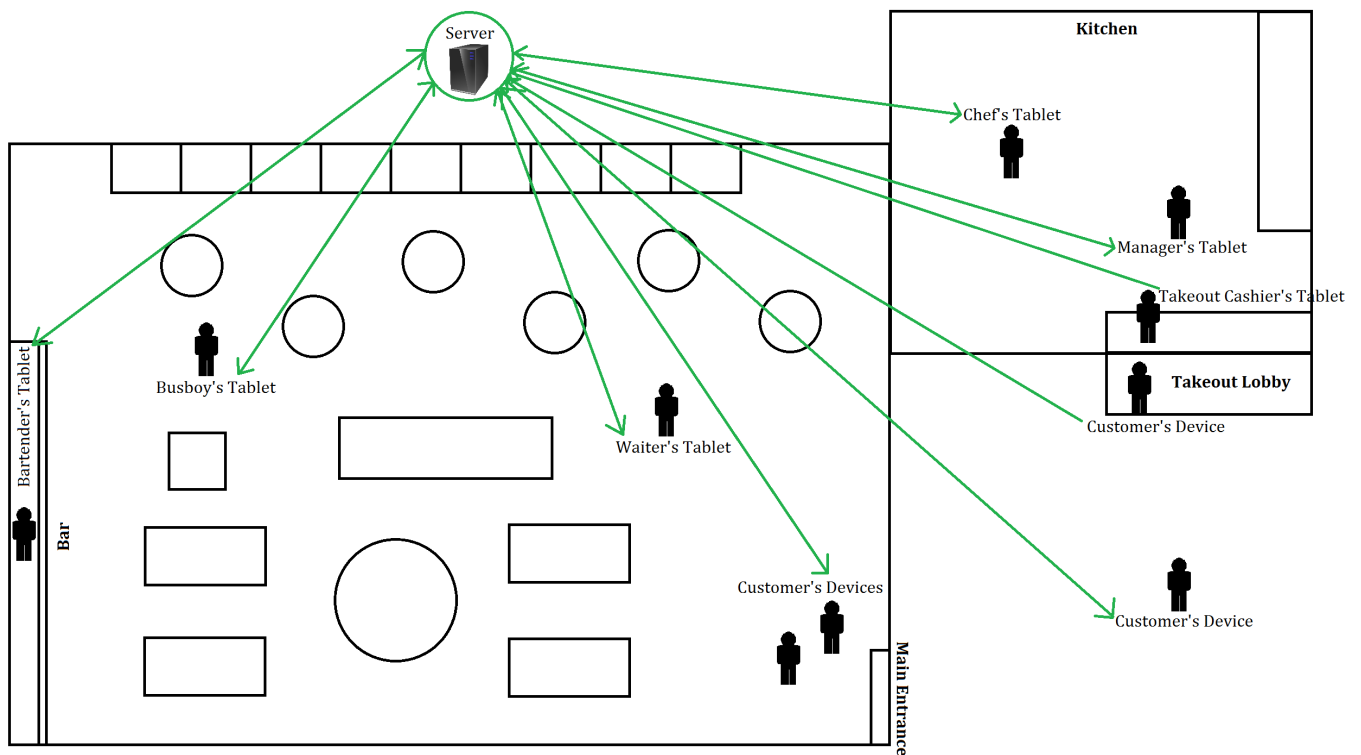
Profit: Revenue subtracted by expenses

Restaurant Customer: Any person that orders an item from the menu or walks into the restaurant.

Take-out: Orders that are prepared for customers that are not eating in the restaurant.

Waiter/ Waitress: Takes customers' orders, brings completed orders to customers, and marks recently vacated tables.

User Stories:



Size Key:

For each user story we include a size of 1 - 10 points. The sizes are rough estimates of how much effort is needed to implement each user story based on our group's technical skills and each user story's perceived complexity.

Priority Key:

ST-X-#: High priority (highly likely to be implemented)

ST-X-#: Middle priority (likely to be implemented)

ST-X-#: Low priority (highly unlikely to be implemented)

As a manager.....

Identifier	User Story	Size
ST-M-1	I can modify the menu based on inventory and customer feedback so that we can serve available and desirable dishes..	8 points
ST-M-2	I can add and hire employees with a given reason.	7 points
ST-M-3	I can quickly find openings in the schedule that need to be filled so that I can easily ask employees to cover those openings.	4 points
ST-M-4	I can easily pull the profits and loss of the store for the week, month or year.	7 points
ST-M-5	I can add expenses and change salaries of employees.	5 points
ST-M-6	I can change item pricing.	5 points
ST-M-7	I can view the amount of tips accumulated from each employee to gauge good customer service	3 points
ST-M-8	I can track inventory lifetime and quantity.	4 points
ST-M-9	I can create new accounts and delegate/ revoke privileges to other employees based on employee rank.	3 points
ST-M-10	I can view timeclock sign-ins for all employees to see arrival and departure times.	5 points

As a chef.....

Identifier	User Story	Size
ST-Ch-1	I can see the queue of orders waiting to be prepared.	4 points
ST-Ch-2	I can mark orders as “In Preparation” and “Complete” .	5 points
ST-Ch-3	I can speak to the waiters/ waitresses through their tablet	4 points
ST-Ch-4	I can modify the menu to make certain dishes available or unavailable if supplies are limited.	5 points
ST-Ch-5	I can record what orders and how many orders I made each shift to track accountability and performance.	3 points
ST-Ch-6	I can adjust and update the supply inventory to let the manager know of any lacking ingredients.	4 points

As a busboy.....

Identifier	User Story	Size
ST-B-1	I can view the tables that need to be cleaned.	4 points
ST-B-2	I can mark dirty tables, tables being cleaned, and clean tables	4 points

As a Waiter/Waitress....

Identifier	User Story	Size
ST-W-1	I can input my customers' orders quickly and have the chef notified of the order without walking to the kitchen.	7 points
ST-W-2	I can view my customers' bill and enter their payment information.	5 points
ST-W-3	I can apply coupons and discounts to the customers' bill.	6 points
ST-W-4	I can mark tables as recently vacated so that tables can be cleaned by busboys as soon as possible.	5 points
ST-W-5	I can see when a party has made their way to their table, and can mark it on the table availability page	6 points
ST-W-6	I can add special instructions to an order in case the customer has a specific request.	3 points
ST-W-7	I can see my average tip, as well as my tip percentage history in order to gauge the quality of my service	8 points

As a bartender.....

Identifier	User Story	Size
ST-BT-1	I can see the queue of drinks to prepare in the order they were placed, and mark each order as in progress or completed	5 points
ST-BT-2	I can pull up a list of cocktail recipes, in case a customer asks for something that I have never made	5 points
ST-BT-3	I can see and alter the status of the inventory of all wines, beers, hard liquor	5 points
ST-BT-4	I can click on a cocktail recipe, and it through color coding the ingredients, it will tell me which we still have stocked	5 points

As a Takeout Cashier.....

Identifier	User Story	Size
ST-T-1	I can enter the payment information for customers' ordering takeout.	5 points
ST-T-2	I can place orders for customers ordering takeout and send those orders to the chef's queue.	6 points
ST-T-3	I can view the progress of customer's takeout orders.	4 points

As a customer.....

Identifier	User Story	Size
ST-C-1	I can quickly order from a smartphone or tablet without having to wait for my waiter.	7 points
ST-C-2	I can remotely place reservations for my party to be entered into the seating queue through the app.	4 points
ST-C-3	I can set what time I would like my order to be added to the kitchen's list, so I am able to order long in advance	4 points
ST-C-4	I can walk in and place my party size and name into the tablet which will notify me where our table is when it's ready	5 points

As an Employee (General).....

Identifier	User Story	Size
ST-E-1	As an employee, I can view my shifts.	4 points
ST-E-2	As an employee, I can pick up open shifts.	5 points
ST-E-3	The menu should give descriptions of the items (ingredients, calories, etc.)	4 points
ST-E-4	As an employee, I can put my shift up for coverage.	6 points
ST-E-5	As an employee, I can sign-in and sign-out of my scheduled shifts.	4 points
ST-E-6	As an employee, I can view all shifts to see who I am working with.	3 points
ST-E-7	As an employee, I can access and view my paycheck stubs and important work-related forms (W-2 Wage and Tax form, Promotion Letter, Termination Letter, etc.)	8 points

Functional Requirements Specification:

Stakeholders

There are several types of stakeholders starting with end users, those who will be directly utilizing the system-to-be in an effort to automate periodic tasks. This would include any kind of employee, i.e waiters, bartenders, busboys, chef, and managers. Customers are stakeholders who do not directly make use of the system, but their interest is held in the enriched experience as a result of the system. Another set of stakeholders includes all those involved in development and management of the system. The interest comes from working to design and implement solutions to create the system.

Actors and Goals

Initiating Actors

Bartender

Role - The employee who is in charge of the bar and preparing drinks.

Goal - Manage the liquor inventory, and prepare drinks on the drinks queue.

Busboy

Role - The employee who is in charge of the cleanliness of the restaurant.

Goal - Manage the status of tables, and clean tables that are marked dirty on the app.

Chef

Role - The employee who is in charge of the kitchen and preparing meals.

Goal - Manage the ingredient inventory, manage the menu, and prepare meals on the order queue.

Customer

Role - The restaurant visitor who orders food and drink from the restaurant for dining-in or taking-out.

Goal - Place, pay for, and receive orders quickly, and choose whether to eat-in or take-out.

Manager

Role - The employee who manages the entire restaurant.

Goal - Manage employees and scheduling, keep track of inventory, and keep track of profits/losses.

Takeout Cashier

Role - The employee who interacts with and serves take-out customers.

Goal - Place orders for take-out customers, keep track of the take-out order queue and charge take-out customers.

Waiter

Role - The employee who interacts with and serves dine-in customers.

Goal - Place orders for dine-in customers, keep track of the dine-in order queue and charge dine-in customers.

Participating Actors

Database

Role - The object that stores information needed for the system.

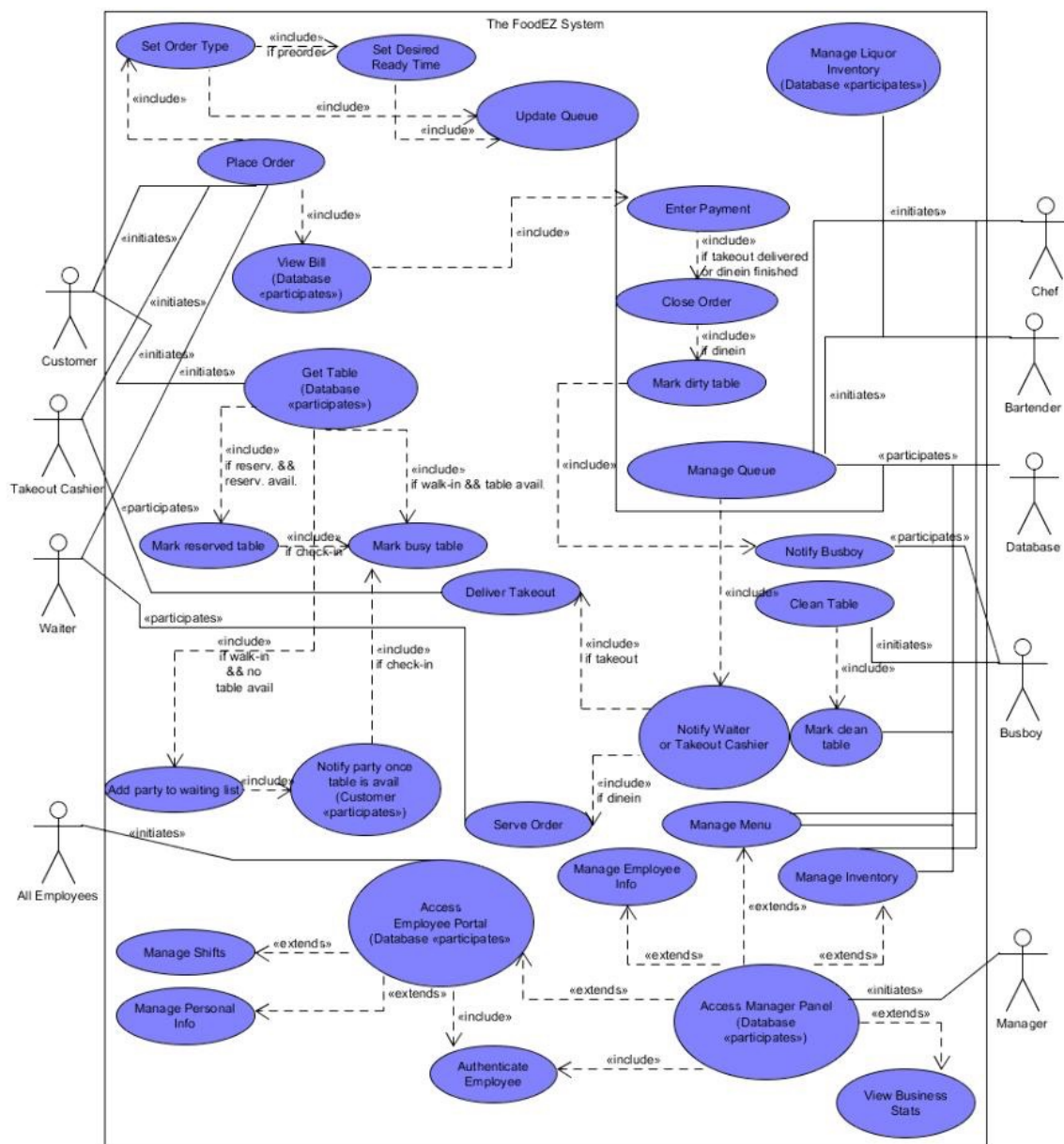
Goal - Store and modify information pertaining to inventory, employees, profits, losses, etc..

Use Cases:

i) Casual Descriptions:

Our group's user stories will serve as the casual descriptions of our use cases.

ii) Use Case Diagram:



iii) Traceability Matrix:

User Stories	UC-1	UC-2	UC-3	UC-4	UC-5
ST-M-1					
ST-M-2					
ST-M-3					
ST-M-4					
ST-M-5					
ST-M-6					
ST-M-7					
ST-M-8					
ST-M-9					
ST-M-10					
ST-Ch-1					
ST-Ch-2					
ST-Ch-3					
ST-Ch-4					
ST-Ch-5					
ST-Ch-6					
ST-W-1					
ST-W-2					

User Stories	UC-1	UC-2	UC-3	UC-4	UC-5
ST-W-3					
ST-W-4					
ST-W-5					
ST-W-6					
ST-W-7					
ST-B-1					
ST-B-2					
ST-BT-1					
ST-BT-2					
ST-BT-3					
ST-BT-4					
ST-T-1					
ST-T-2					
ST-T-3					
ST-G-1					
ST-G-2					
ST-G-3					
ST-G-4					
ST-G-5					

User Stories	UC-1	UC-2	UC-3	UC-4	UC-5
ST-G-6					
ST-G-7					
ST-C-1					
ST-C-2					
ST-C-3					
ST-C-4					

iv) Fully Dressed Use Cases:

USE CASE UC-1: PLACE ORDER

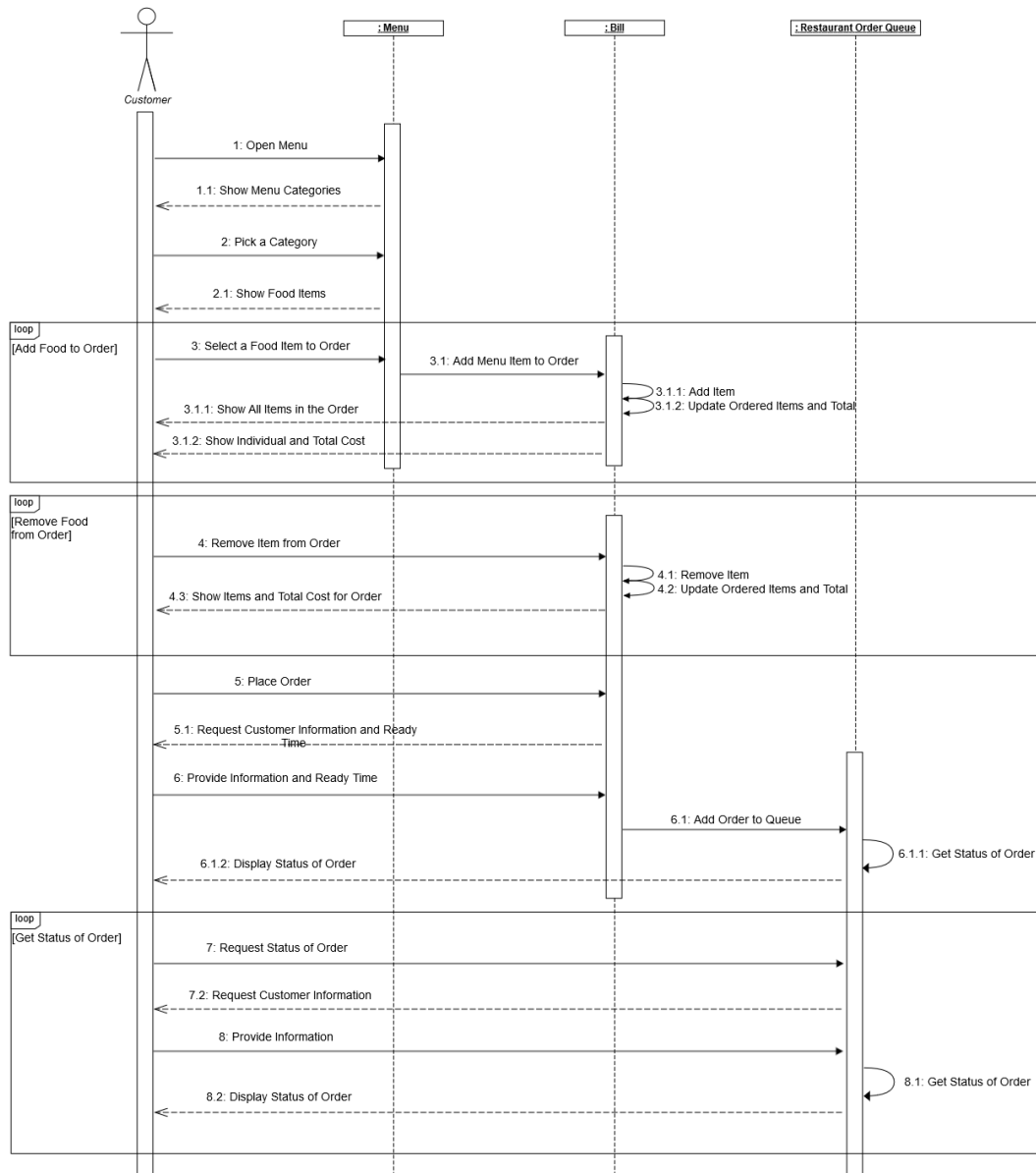
Related User Stories::	ST-Ch-1to2, ST-W-1to3, ST-W-5, ST-BT-1, ST-T-1to3, ST-C-1
Initiating Actor:	Customer
Actor's Goal:	To order food from the restaurant using the application on their smartphone or tablet.
Participating Actors:	Takeout Cashier, Waiter
Pre-Conditions:	The GUI is displayed with the menu of food items and an option to add and order them.
Post-Conditions:	The food status is shown on the screen.

Flow of Events for Main Success Scenario:

- 1) Customer picks the option to see the menu in the application.
- ← 2) The system shows all the food and drink items in their respective categories, as well as the current order's bill on the right side.
- 3) Customer chooses which food category they would like to add to the order.
- ← 4) The system displays all the items associated with the picked category, with an ability to view more information about an item (price and an option to see the nutritional facts) and an option to add to order.
- 5) Customer selects the option to add the desired item to the order.
- ← 6) The system stays in the food and drinks menu page, with a newly updated bill on the right which includes every item added, their total cost, and options to remove an item or send the order request to the restaurant.
- 7) Customer selects the option to send the order request to the restaurant.
- ← 8) System sends the order to the restaurant.
- ← 9) System displays the status of the order (i.e. if it has been cooked or not), with an option to go back to the main menu.
- 10) The customer chooses to stay on the status page.

Flow of Events for Extension(Alternate Scenarios):

→ 1a) Customer picks the option to see the status of a current order.
← The system prompts the customer to provide their order's unique ID.
→ Customer inputs their order ID.
← The system displays the status of the order.
→ 1b) Customer picks the option to see the status of a current order.
← The system prompts the customer to provide their order's unique ID.
→ Customer inputs an incorrect order ID.
← The system displays the message, "Invalid order ID entered, please check to make sure that you have put it in right."
→ 3a) Customer presses the back button to go back to the main menu.
← The system goes back to the main menu.
→ 5a) Customer selects option to see the nutritional facts of an item.
← The system displays the selected items nutritional facts.
→ Customer presses back button to return to the menu page.
→ 7a) Customer selects the option to remove an item from the bill.
← The system removes the item from the bill.
→ 7b) Customer selects adds another item to his order.
← The system stays in the food and drinks menu page, with a newly updated bill on the right which includes every item added.
→ 7c) Customer specifies the ready times of all food items.
← The system sends the order to the restaurant's queue with the order type: "Takeout", and the ready times for each item. It also sends the details of the order to the database for the takeout cashier to see.
← 10a) Customer selects the option to go back to the main menu.
← The system enables an option to view an existing order's status on the main menu.

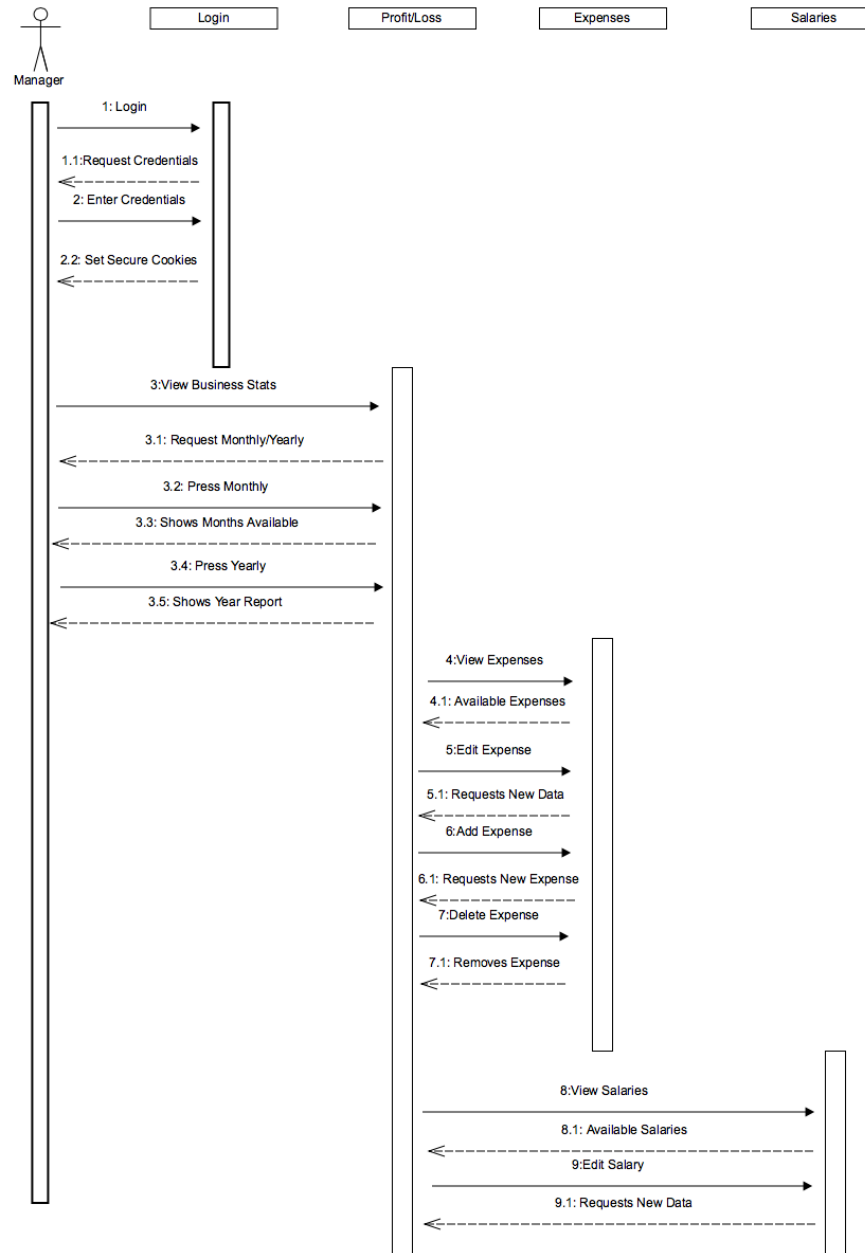


USE CASE UC-2: VIEW BUSINESS STATS

Related User Stories::	ST-M-4,ST-M-5,ST-M-6
Initiating Actor:	Manager
Actor's Goal:	To view profit/losses and edit expenses of the store and salaries of employees.
Participating Actors:	None
Pre-Conditions:	Manager Must be logged in. Screen Displays GUI of FoodEZ and allows manager to Enter Business Stats Section
Post-Conditions:	Goes back to Main Menu so Manager can Continue to do something else.
Flow of Events for Main Success Scenario:	<ul style="list-style-type: none">→ 1) Manager Logs in to FoodEZ and chooses "View Business Stats".← 2) System Opens up Profit/Loss Page→ 3) Manager has the ability to choose stats of a single month or year.→ 5) System Shows Options to choose from: Expenses or Salaries or Main Menu.← 6) Manager Presses Main Menu→ 7) System returns Manager to Main GUI Interface.

Flow of Events for Extension(Alternate Scenarios):

- 3a) Manager Chooses "A Single Month".
- ← The system prompts the customer to provide which month he would like to see
- Manager Chooses Month from drop down list
- ← Manager Can Return to Profit/loss Section
- 3a) Manager Chooses "Year".
- ← Manager can choose "Chart" to view the flow chart of Profit/Loss of the year.
- ← Manager Can Return to Profit/loss Section
- 5a) Manager Selects "Expenses"
- ← Manager has ability to see total expenses of store.
- Manager presses "edit" to edit a single expense of the store (Food or Electricity)
- Manager presses back button to return to the Profit/Loss page.
- 5b) Manager Selects "Salaries"
- ← Manager has ability to view all Salaries of employees.
- Manager Presses "edit" to edit a salary of an employee.
- Manager presses back button to return to the Profit/Loss page.



USE CASE UC-3: MANAGE QUEUE

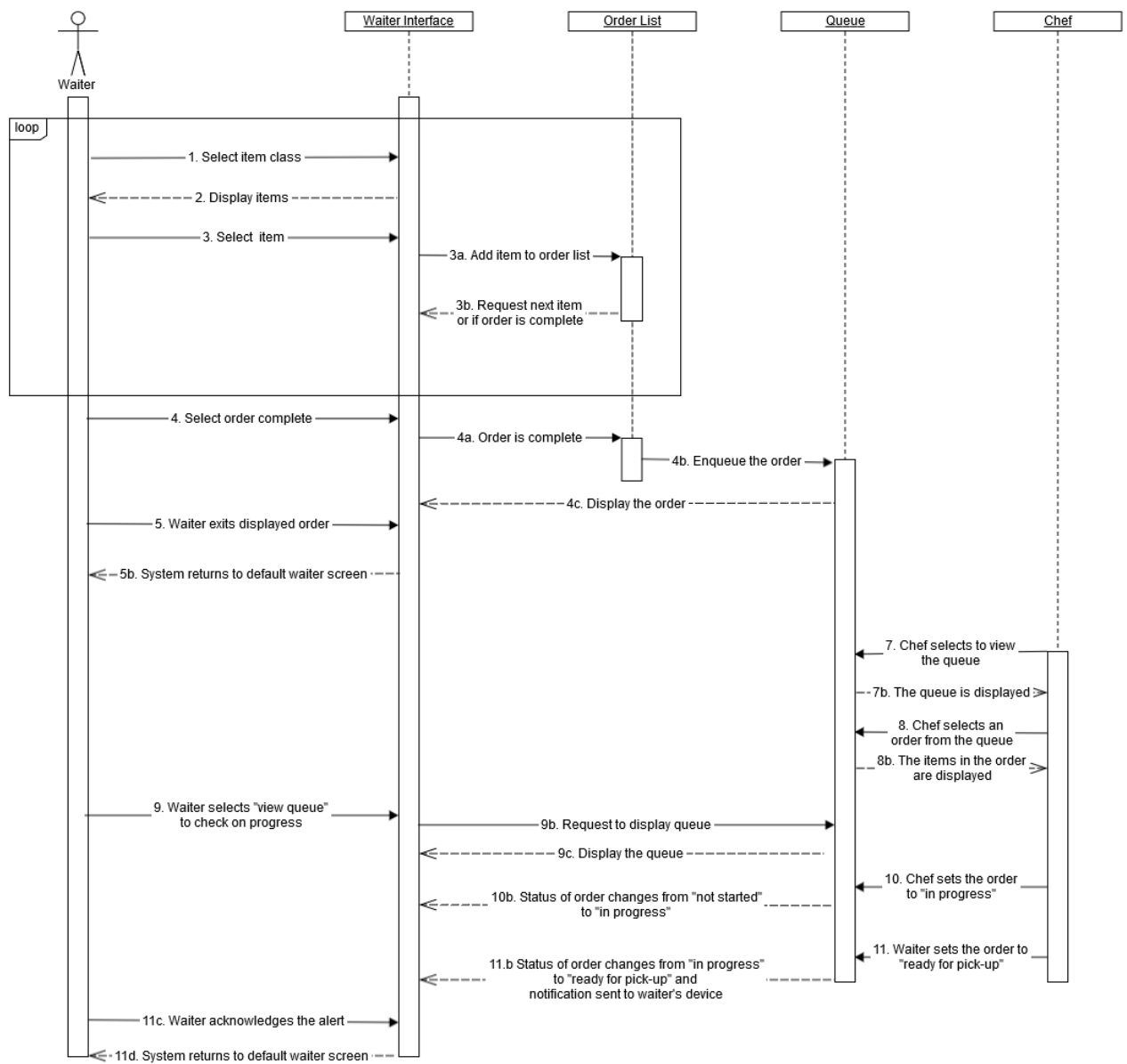
Related User Stories::	ST-Ch-1, ST-Ch-2, ST-W-1, ST-BT-1
Initiating Actor:	Waiter
Actor's Goal:	To add an order to the queue
Participating Actors:	Chef, Bartender
Pre-Conditions:	The waiter using the order screen to select the items that a seated party orders
Post-Conditions:	The order progresses through the various stages from "not started" to "ready for pickup"

Flow of Events for Main Success Scenario:

- 1) Waiter acknowledges customer's desired item, and goes to the "Place Order" screen. adds each item to the list of the order, then submits
- ← 2) System displays the list of the various item classes (entree, dessert, beverages, appetizer).
- 3) Waiter clicks on the class of the customer's desired item
- ← 4) System displays the list of items within each class. A "view order" option is present
- 5) Waiter clicks on the item to add to the order, and option "ingredients" and "add note" is displayed next to each item
- ← 6) System adds the item to the list of the whole table's orders.
- 7) Waiter repeats steps 1,3, and 5 until all of the table's desired items are in the order, then presses the "Place Order" option, which will add the order to the queue.
- ← 8) The system shows the whole queue, which can be navigated via scrolling. Each order that has been placed through the waiter's device will have an option to cancel the order or revise the order, as well as a progress status. Orders are added to the end of the queue when they are placed. Items that are prepared at the bar will be sent to the bartenders' devices, and items that the kitchen is responsible for will be sent to the chefs' devices.
- 9) Chef or bartender finish their current task, then check the queue to see what needs to be prepared next.
- 10) The chefs and bartenders can also see the queue. When an order is pressed, it will go to a new screen that shows each item and several options are displayed. The options are to set the progress status of the whole order. These options will be "not started", "in-progress", "on hold", or "ready for pick-up". They will set the item that they are preparing to "in-progress". There is also an option for "recipe"
- 11) Upon successful completion and delivery to the waiter pick-up area of the kitchen or bar, they will set the status to "ready for pick-up".
- ← 12) The device of the waiter who placed the order that is complete will be alerted via a notification, and they can retrieve the order to bring to the customers.

Flow of Events for Extension(Alternate Scenarios):

- 3a) Waiter can select “back” to return to the item class screen in the event that they selected the wrong item class
 - ← System will return to the item class selection screen
- 4a) Waiter selects the “view order” tab to see all items.
 - ← System will display the order list
- Waiter selects the “add note” in order to list details such as the rareness of steak or exclusion of certain ingredients
 - ← System will add the item to the order list, with the note displayed under the item in the order list
- 5a) Waiter clicks on the item multiple times to increase the quantity of the item
 - ← System will show multiple instances of the item in the order list
- 5b) Waiter selects the ingredients option because the customer inquired about the ingredients in a recipe for allergy/dietary reasons
- 10a) The chefs forgets the exact recipe for the item, and selects the “recipe”
 - ← System displays ingredients and instructions for making the item

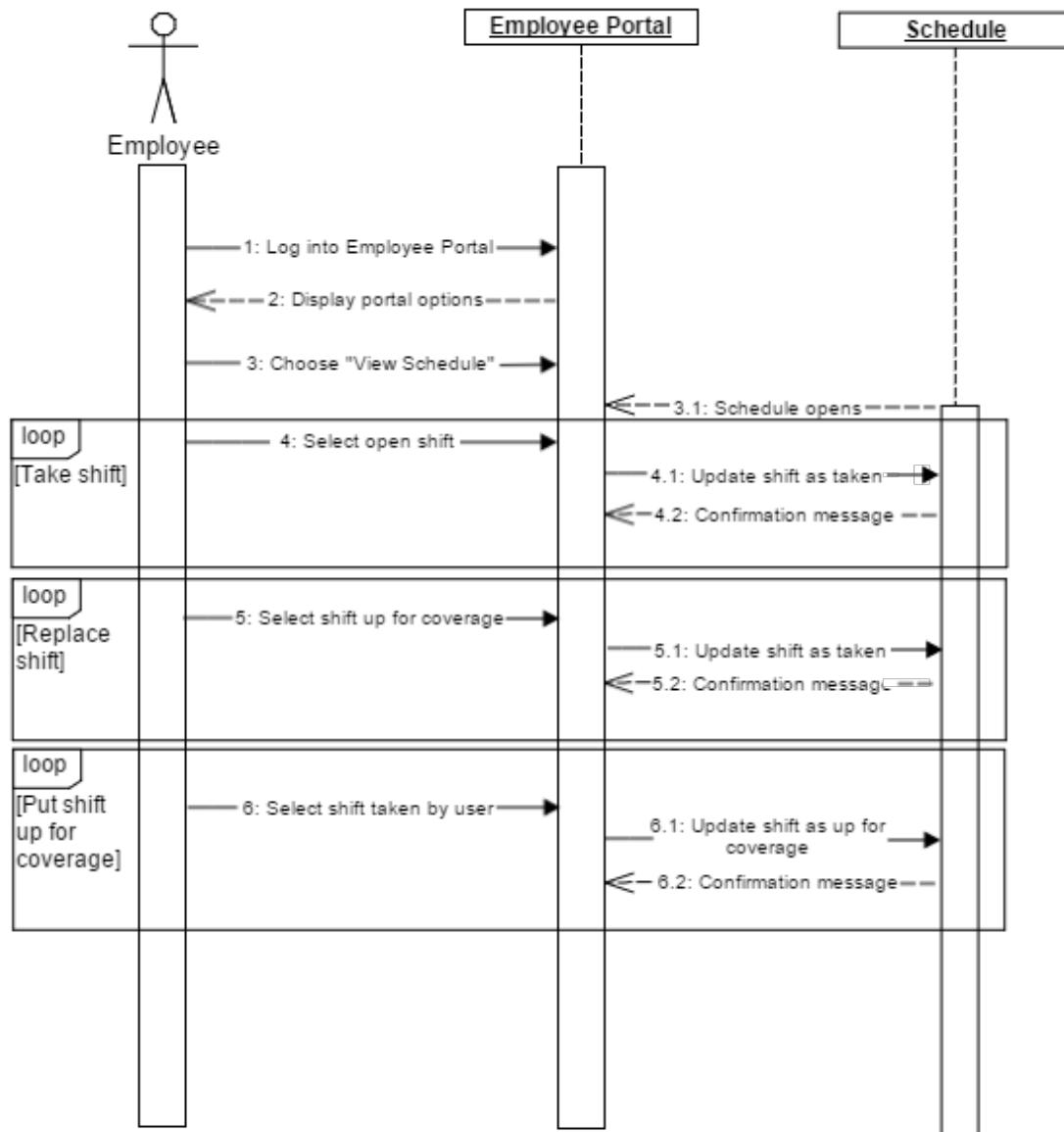


USE CASE UC-4: MANAGE SHIFTS

Related User Stories::	ST-G-1, ST-G-2, ST-G-4 to ST-G-6
Initiating Actor:	Bartender, Busboy, Chef, Take-out Cashier, Waiter
Actor's Goal:	To add, replace, or request coverage for shift in the work week.
Participating Actors:	None
Pre-Conditions:	User has logged in as staff and has the "Employee Portal" open.
Post-Conditions:	Shift information has been updated and is visible by all users with access.
Flow of Events for Main Success Scenario:	<p>→ 1) User selects the "View Schedule" option.</p> <p>← 2) The system shows the schedule for the next two weeks by displaying all shifts in that time period – including those which are taken, up for coverage, or need to be filled.</p> <p>→ 3) User selects a shift which needs to be filled and clicks the corresponding timeslot.</p> <p>← 4) The system gives a confirmation that the shift is now theirs and updates the information accordingly in the backend which will show for any user on the employee portal in the future.</p>

Flow of Events for Extension(Alternate Scenarios):

→ 1a) User selects the "View Schedule" option.
← 2) The system shows the schedule for the next two weeks by displaying all shifts in that time period – including those which are taken, up for coverage, or need to be filled.
→ 3) User selects a shift which is taken by them and clicks the option "Put up for coverage."
← 4) The system gives a confirmation that the shift is now up for coverage and updates the information accordingly in the backend which will show for any user on the employee portal in the future.
→ 1b) User selects the "View Schedule" option.
← 2) The system shows the schedule for the next two weeks by displaying all shifts in that time period – including those which are taken, up for coverage, or need to be filled.
→ 3) User selects a shift which is up for coverage and clicks "Fill."
← 4) The system gives a confirmation that the shift is now theirs and updates the information accordingly in the backend which will show for any user on the employee portal in the future.



USE CASE UC-5: MANAGE MENU

Related User Stories::	ST-M-1, ST-M-6, ST-M-7, ST-Ch-4, ST-Ch-6, ST-BT-2, ST-BT-3, ST-BT-4
Initiating Actor:	Managerial Staff, Chefs
Actor's Goal:	To modify the menu based on various different reasons.
Participating Actors:	None.
Pre-Conditions:	User has the "Edit Restaurant Menu" screen open.
Post-Conditions:	Restaurant menu is updated with user's changes and modifications
Flow of Events for Main Success Scenario:	<p>→ 1. Persons who have privileges to edit the restaurant menu select the "Edit Restaurant Menu" option in the "View Menu" screen</p> <p>← 2. Internal system displays existing menu with multiple options for editing purposes: add or delete menu items to each category, modify the ingredients in a dish (menu subject to changes due to ingredient availability), create new categories</p> <p>→ 3. User can modify category names and add or delete items from specific categories</p> <p>← 4. Internal system displays qualities of each menu item within the categories including the price, name, ingredients used, and ingredient count.</p> <p>→ 5. Persons who have privileges selects the "Add New Item" option</p> <p>← 6. Internal system prompts the user to enter information about the new item including "Name", "Price", "Ingredients Used", "Inventory Count", and "Customer Favorite".</p> <p>→ 7. Persons who have privileges clicks "Save and Add Item to Menu".</p> <p>← 8. Internal system adds the item to the menu based on price.</p> <p>→ 9. User saves changes and clicks "Return to Main Menu" after completion of editing the menu.</p> <p>← 10. Internal system returns to main menu in FoodEZ application interface.</p>

Flow of Events for Extension(Alternate Scenarios):

→ 2a. Persons with privileges selects "Delete Menu Category".

← Internal system prompts user with "Deleting X menu category will result in a loss of all proceeding menu items within X menu category. Will you proceed to delete X category?", where X is a category name. System will prompt the user to choose "Accept" or "Decline".

→ User selects "Accept".

← System deletes category, as well as all menu items within the category, and returns back to the editing menu.

→ 3a. Users select "Delete Item" within a category.

← System prompts user with "Are you sure you want to delete item: X", where X is an item name. System will prompt the user to chose "Accept" or "Decline".

→ User selects "Accept".

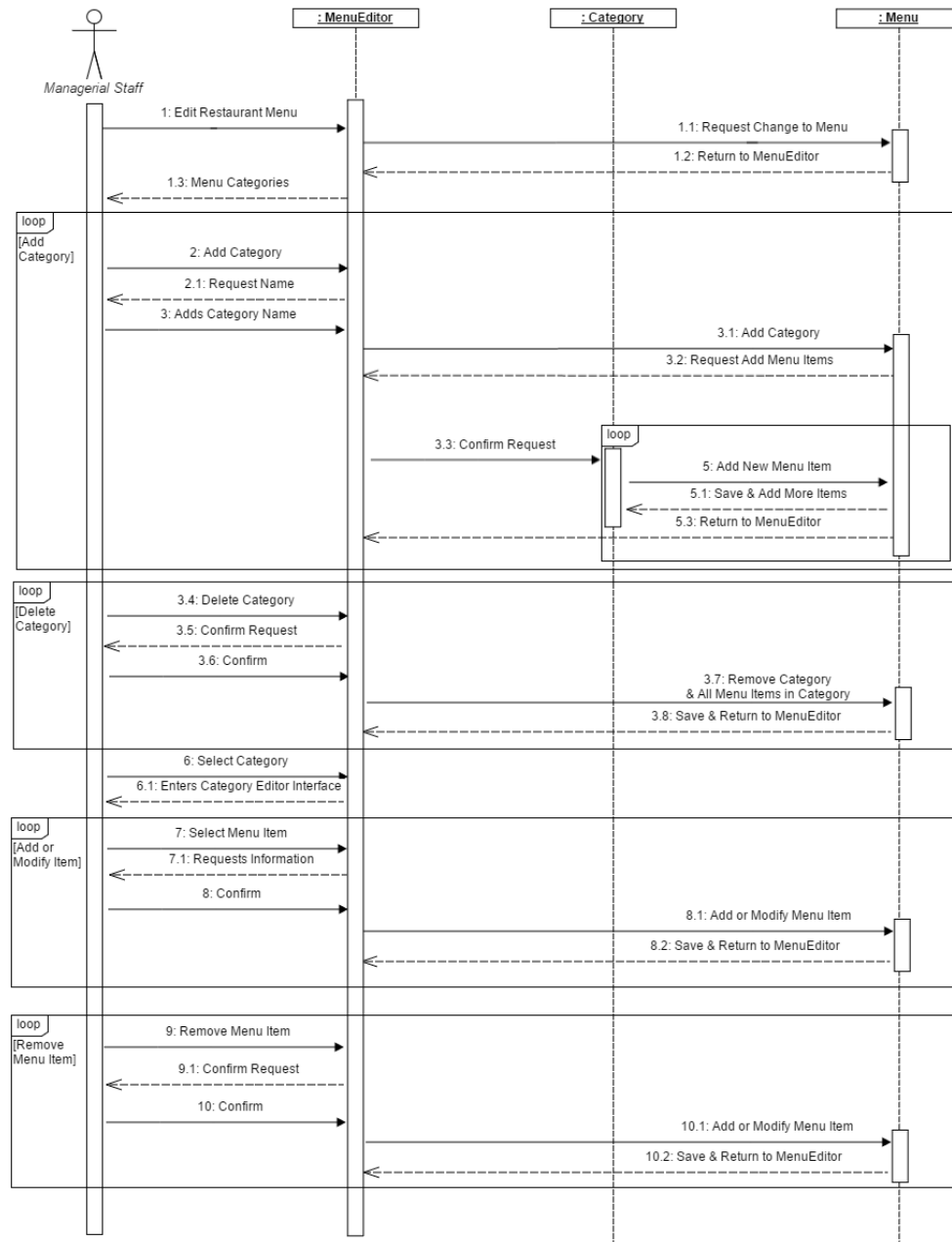
← System will automatically delete the item, and returns back to the editing menu.

→ 4a. User selects "Edit Menu Item Properties", where user can alter the price, name, ingredients used, and ingredient count.

← Internal system prompts user with textboxes to modify the price, name, ingredients used, and ingredient count of the menu item.

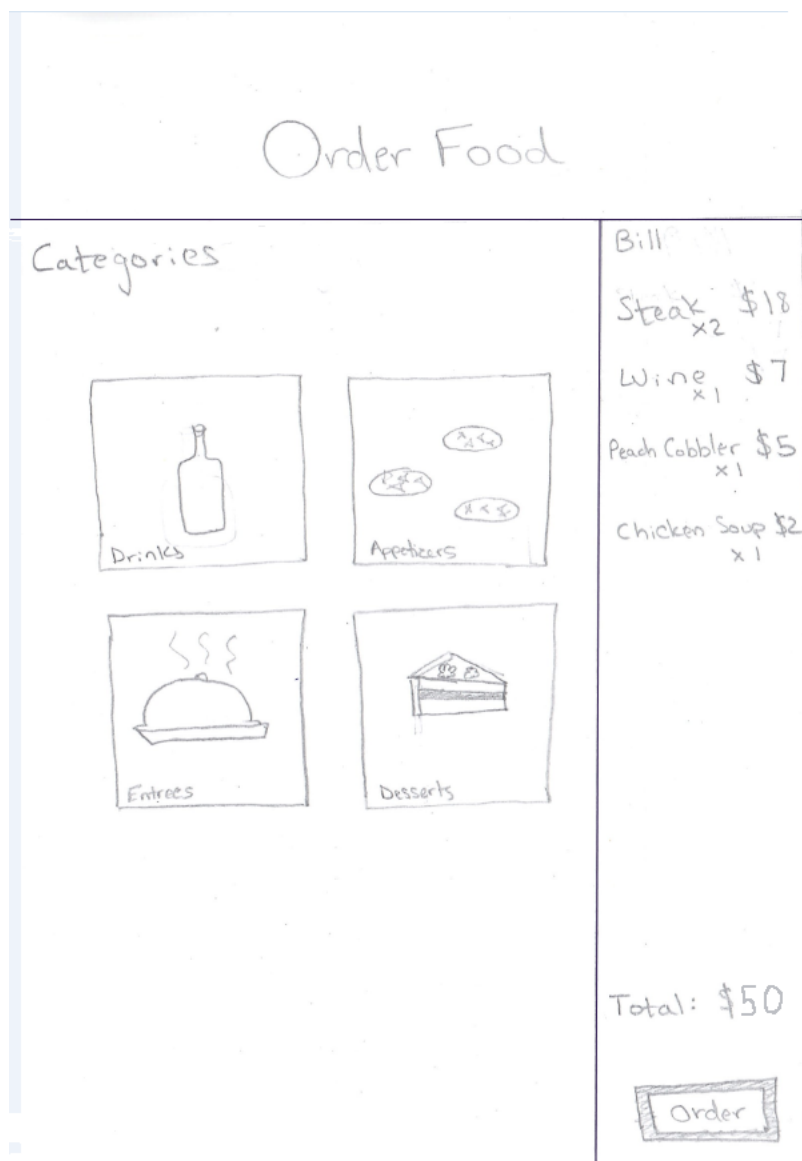
→ Persons with privileges edits the appropriate information and clicks "Update All".

← System will update the edited information and return to the editing menu.



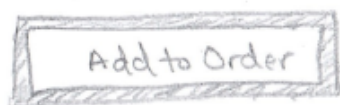
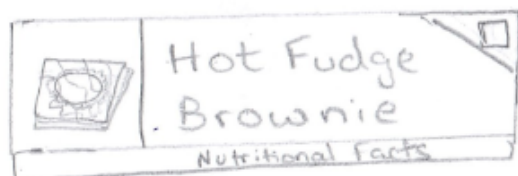
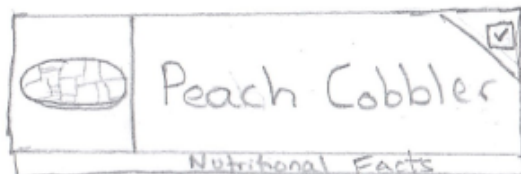
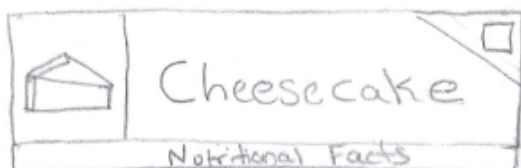
User Interface Specification:

The user of the app will enter the main menu and be able to press order food. Allowing to pick a category and easily press the food of his/her choice while adding it to the bill simultaneously.



Order Food

Desserts



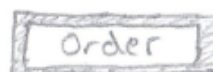
Bill

Steak \$18
x2

Wine \$7
x1

Chicken \$2
Soup
x1

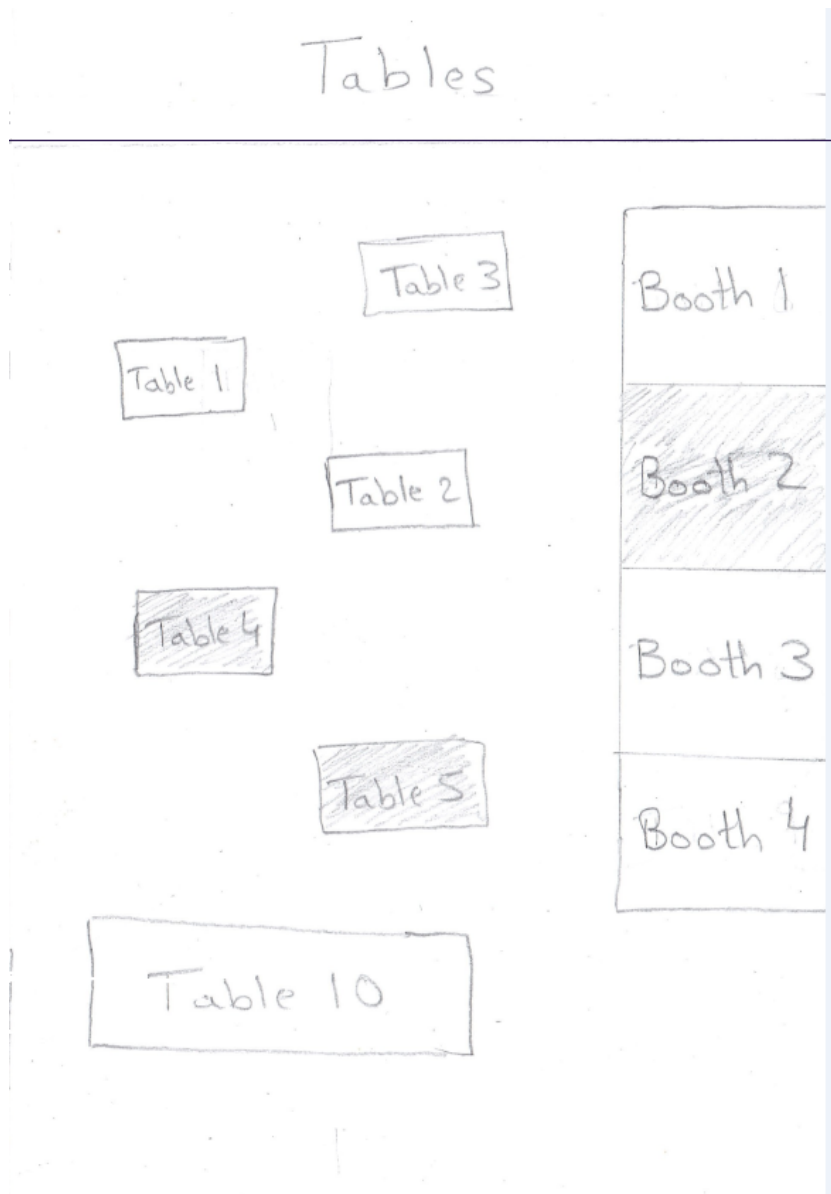
Total: \$45



The Queue will show which tables had ordered and be able to see which ordered first. The user of the app will also be able to press on the table of their choice to see what exactly this table has asked for and be able to update the progress of the table.

Queue		
Table 5		
Food Item	Qty.	Done
Steak	2	<input checked="" type="checkbox"/>
Peach Cobbler	1	<input type="checkbox"/>
chicken Soup		<input type="checkbox"/>

The waiters can also open from the main Menu the view of tables in the restaurant to view which is taken and which needs to be cleaned. Simply the user will press on View Tables and will be able to see it very clearly. Allowing him to edit the status of each table.



User Effort Estimation:

Scenario 1: Waiter Places Order

1. Navigation: Select the option to go to menu.
 - a) Select the desired item category
 - b) Select the desired item, tap more than once to increase quantity
 - i. Waiter may choose to remove certain ingredients at customers request, or attach a brief note to the item.
 - c) Once all desired items are in the order, select “place order” to add the order to the queue.

Scenario 2: Chef Prepares Order

2. Navigation: Select the option to go to the queue.
 - a) Chef selects an order from the queue, the items within the order (including attached notes or ingredients alterations) are displayed
 - b) Chef selects “in progress” once the order preparation is about to begin
 - c) Chef selects “complete” once the order is ready for pick-up

Scenario 3: Busboy Cleans Table

3. Navigation: Select the option to go to the table layout.
 - a) Busboy selects a table that is “ready for cleaning” and click on it once to change its status to “cleaning in progress”
 - b) Busboy clicks on it once more to change its status to “ready for seating” upon completion of cleaning

Scenario 4: Customer enters their party into the seating queue

4. Navigation: Select “Add my party”.
 - a) Customer enter his/her name into the text box labeled “Party leader”.
 - b) Customer enter his/her party size into the text box labeled “Party size”.
-

Domain Analysis:

1) Domain Model:

i) Concept Definitions:

Responsibility Description	Type	Concept
R-01: Coordinates scheduling, views profit/losses, delegates work to other employees	D	Manager
R-02: System knows all expenses and profits and losses	K	Profit/Loss
R-03: Can edit expenses of store	D	Manager
R-04: Customer accesses the menu online and places orders.	D	OrderItem
R-05: Knows all orders from all customers/tables.	K	OrderQueue
R-06: System sends orders to the restaurant.	D	Order
R-07: System knows and displays status of online order for customer viewing	K	OrderStatus
R-08: System knows when customer provides an incorrect order ID	K	Order
R-09: Change employee information including position, status, wage, contact information, etc.	D	InfoChanger
R-10: Modify menu	D	MenuModifier
R-11: Place food orders within the restaurant	D	Waiter
R-12: Place drink orders within the restaurant	D	Bartender

R-13: System knows count of ingredients	K	IngredientCount
R-14: System adds item to list of entire table's orders	D	Check
R-15: Waiter places table's orders	D	Order
R-16: System tracks order status within restaurant	K	OrderStatus
R-17: Chefs update order status	D	OrderStatus
R-18: System order status changed to "ready for pick-up"	K	OrderStatus
R-19: System keeps track of entire table's bill and tip calculations	K	Check
R-20: Waiter returns to system to retrieve check	D	Check
R-21: System receives payment and notifies busboy to clean table	D	CleanTable
R-22: Busboy alerts system upon table cleaning completion	D	CleanTable
R-23: System knows schedule of all employees	K	Schedule

ii) Association Definitions:

Concept Pair	Association Description	Association Name
Manager ↔ MenuModifier	Allows manager to modify menu	Modifies
Manager ↔ Profit/Loss	Manager tracks profit gain and profit loss	Provides Data
Manager ↔ IngredientCount	Manager requests updates on IngredientCount to manage menu items	Requests Updates
Manager ↔ InfoChanger	Manager alters confidential employee information	Modifies
Customer ↔ Waiter	Customer passes order requests to waiter	Conveys Requests
Waiter ↔ Chef	Waiter passes order requests to chef	Conveys Requests
Customer ↔ OrderItem	Customer adds a menu to the bill, and places the order.	Conveys Requests/Requests Save
Check ↔ OrderQueue	Bill provides the data of the ordered items to the OrderQueue	Provides Data
Waiter ↔ OrderStatus	Waiter periodically requests updates to OrderStatus	Requests Updates
Chef ↔ OrderStatus	Chef passes updates to OrderStatus	Provides Data
Waiter ↔ Check	Waiter retrieves and requests check for appropriate table	Conveys Requests/Provides Data
Waiter ↔ Customer	Waiter passes check and requests payment	Provides Data/Conveys Requests
BusBoy ↔ Check	BusBoy prepares cleans table once check is paid	Prepares
Waiter ↔ Tables	Waiter updates the the status of tables	Provides Data

iii) Attribute Definitions:

Concept	Attributes	Attribute Description
Manager	Name	Name of Manager
	Manager ID	Manager has a unique identification credential associated with login
	Privileges	Manager has specific privileges including menu modifications, hire/terminate employees, track profit/loss, etc.
Waiter	Name	Name of the waiter
	Waiter ID	Each waiter has a unique identification credential associated with them
	Table Association	The tables to which the waiter is serving
Employee	Name	Name of the employee
	Identity	Each employee has a unique identification credential associated with them
	Contact Information	The employee's address, email address, phone number, etc.
	Position	Position held by the employee at the restaurant
Profit/Loss	Total Gain	Total amount of income made from restaurant transactions
	Total Expenses	Total amount of costs spent by restaurant
	Net Profit/Net Loss	Profit or loss made by the restaurant
OrderQueue	Orders	Orders are placed on a queue within the system, which can be accessed by the chef

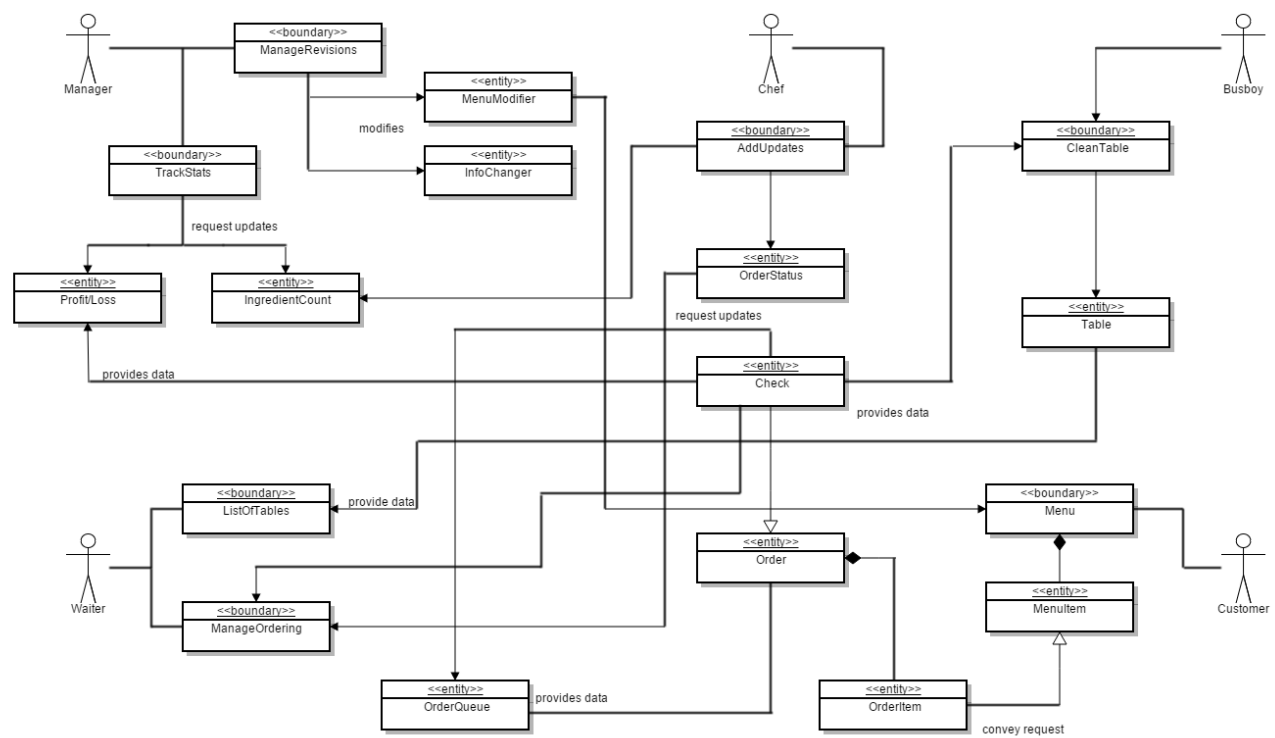
OrderItem	Name	Name of the menu item
	Cost	Price of the menu item
	Category	Category with which the menu item is associated
OrderStatus	Order Placed	OrderStatus changes to Order Placed
	Preparation	OrderStatus changes from Order Placed to Preparation
	Bake	OrderStatus changes from Order Placed to Bake (when applicable)
	Quality Check	OrderStatus changes from Bake to Quality Check
	Ready to Pick-Up	OrderStatus changes from Quality Check to Ready to Pick-Up
InfoChanger	Name	Allows for altering the name of Employee
	Wage	Allows for altering the payment
	Contact Info	Allows for altering the contact information of an employee
	Schedule	Allows for altering the schedule of an employee
	Position	Allows for altering the position of an employee
MenuModifier	Name of Item	Allows for altering the name of the selected item
	Ingredients	Allows for altering ingredients of a selected item
	Price	Allows for altering the price of a selected item
Bartender	Name	Name of the bartender
	Bartender ID	Each bartender has a unique identification credential associated with them

IngredientCount	Name	Name of the ingredient
	Total Stock	Amount of stock available in the kitchen for each ingredient
Order	Customer Information	Information about the customer who placed the order (if a takeout order)
	Order Number	The order has a unique identification number
	Table Number	The table number with which the order is associated
	Check	The most updated check for the order
Check	Order ID	The order ID with which the check is associated
	Number of Items	The total number of items ordered
	Total Cost	The total cost of all the items in the order
	Tip	Tip paid by customer
CleanTable	Status	Ready to be cleaned once customer departs
Schedule	Date	The various dates available on the schedule
	Time	The time slots available on each day
	Employee Name	Name of the employee working a certain shift

iv) Traceability Matrix

		Domain Concepts														
Use Case	PW	Manager	Waiter	Employee	Profit/Loss	OrderItem	OrderQueue	OrderStatus	InfoChanger	MenuModifier	Bartender	IngredientCount	Order	Check	CleanTable	Schedule
UC1	9		X			X	X						X			
UC2	5	X		X	X									X		
UC3	8		X	X		X	X	X			X		X			
UC4	5	X	X	X	X				X		X					X
UC5	7	X		X						X		X				

v) Domain Model Diagram



System Operations Contract:

Name:	Customer Places Order
Responsibilities:	Order food from the restaurant using the application on their smartphone or tablet.
Use Cases:	UC-1
Exceptions:	None
Preconditions:	The application's GUI is displaying a menu with various food and drinks items, and an option to add them to bill and order them.
Postconditions:	The order is placed and added to the restaurant queue, after which its status is shown.

Name:	View Business Stats
Responsibilities:	View profit/losses and edit expenses of the store and salaries of employees.
Use Cases:	UC-2
Exceptions:	None
Preconditions:	Manager must be logged in. Screen displays GUI of FoodEZ and allows manager to enter the business stats section.
Postconditions:	Goes back to main menu so the manager can continue to do something else.

Name:	Manage Queue
Responsibilities:	Add an order placed by the customer to the queue.
Use Cases:	UC-3
Exceptions:	None
Preconditions:	The order screen on the Waiter's device allows him to select the items that a seated party orders.
Postconditions:	The order progresses through the various stages from "not started" to "ready for pickup".

Name:	Manage Shifts
Responsibilities:	Add, replace, or request coverage for shift in the work week.
Use Cases:	UC-4
Exceptions:	None
Preconditions:	User has logged in as staff and has the "Employee Portal" open.
Postconditions:	Shift information has been updated and is visible by all users with access.

Name:	Manage Menu
Responsibilities:	Modify the menu based on various different reasons.
Use Cases:	UC-5
Exceptions:	None
Preconditions:	User has the "Edit Restaurant Menu" screen open.
Postconditions:	Restaurant menu is updated with user's changes and modifications

Mathematical Model:

Table Designation Algorithm

As customers enter the restaurant they are asked to specify their party size among other things into a tablet. This algorithm uses the party size and compares it against the available tables to see which table should be designated to the customer. The algorithm utilizes a sorted list (which is sorted and prioritized by a first come first serve basis) to take input from and then compares the party sizes of all customers and find a suitable table. If the table size matches the party size, then those two are matched, otherwise if the party size is less than the table size and no other party size matches the table then they are given the table.

Pseudo Code:

```
while (sorted list of customers does not equal 0)
{
    while (iterating through the list of available tables)
    {
        while (iterating through sorted list of customers)
        {
            if (size of table is equal to a party size in the customer list)
            {
                //Display customer name and table on the tablet
                //Along with map of restaurant highlighting the table
            }

            else if(size of table is greater than party size and no other party matches
            table size)

            {
                //Display customer name and table on tablet
                //Along with map of restaurant highlighting the table
            }
        }
    }
}
```

Information Modification Algorithm

Whether it's hiring or terminating an employee, the manager will need the necessary options in order to modify information concerning an employee. Below gives a quick pseudocode algorithm on how a manager can edit and modify confidential information.

```
if (credentials entered match manager's credentials, allow access)
{
    //search for profile of employee manager wants to modify
    {
        while(1)
        {
            switch (manager chooses options)
            {
                case name:
                    //edit name of employee
                    break;
                case wage:
                    //edit wage of employee
                    break;
                case contact info:
                    //edit contact info of employee
                    break;
                case schedule:
                    //edit schedule of employee
                    break;
                case position:
                    //edit position of employee
                    break;
            }
            if (finished editing)
            {
                //save profile of employee
                //break and return to search screen
            }
            else
            {
                return to switch
            }
        }
    }
}
```

```
else
{
    print("Incorrect credentials.")
    return to login screen
}
```

Order Progress Queue Algorithm

Each order that is entered into the order queue most likely contains several items. Orders that have not yet been started have display an order status of "Not Started". Upon beginning preparation of the items in an order, the order status associated with that specific order will become "In Progress (0%)". Each item within the order also has a status, which can be either "Not Started" or "Complete". During the time in which the order is "In Progress", the percentage shown represents the amount of completed items within the order. Each time the chef marks an order as complete, the new percentage is displayed on the status bar of the order in the order queue. Once all items are complete, the order status changes to "Ready for Pick-Up", at which time the device of the waiter who placed the order will receive a notification.

```
//assume order has data members numberComplete and numberIncomplete
//...and completionPercentage, as well as member function setPercent
//assume item has data members status and member functions setStatus
```

```
void changeltemStatus(order, item, newStatus)
{

    //if item was not started and is being started, change status

    if ( (if (item.status()=="Not Started") && (newStatus== "In
        Progress"))
    {
        item.setStatus("In Progress");
    }

    //if item was started and is now completed, change status and
    //... recalculate and display new completion percentage

    if ( (if (item.status()=="In Progress") && (newStatus ==
        "Complete"))
    {
        item.setStatus("Complete");
    }
}
```

```
        order.setPercentage( (order.numberComplete()/(order.numberComplete()
                             +order.numberIncomplete()))*100 );
    }
    //check if order is complete, if so, notify the waiter who
    //entered the order

    if (order.completionPercentage==100)
    {
        notifyWaiter(order);
    }
}
```

Product Ownership:

Within our group of 6 members, we have split into 3 pairs to maximize productivity. The pairs are as follow: Jonathan and Paolo, Julian and Sujay, and Omar and Kanav. Each pair will have specific tasks during the next few weeks that they will contribute. The main objective for the next few weeks will be to create the basis of the restaurant automation application before we branch off into sub-features using Windows.

Jonathan and Paolo

Completed tasks: Created a first draft UI layout of the restaurant with tables.

Current tasks: Creating a functional menu for waiters/waitresses to use.

Future tasks: Add more functionalities which include:

- Create a functional menu for waiters/waitresses to use
- Create interface for customers' bill
- Average tip calculator for managers to gauge Waiter Service
- Display of common tip denominations in the billing screen in order for a waiter to gauge the satisfaction of each party

Julian and Sujay

Completed tasks: Created the first draft UI for the login screen which employees will be able to use to login to the app.

Current tasks: Working on ways to code the app so that each login is unique and leads to the designated page for the employee logging in.

Future tasks: Add more functionalities for different users which include:

- Speak to the chef
 - Table availability and wait time
-

- Chef mode, where the chef will be able to see the database listing the meals in the order of which they were placed. Upon clicking the meal, it will open up and show the individual items of the meal, along with three buttons that are Stopped, In Progress, and Complete. Shows time since start, estimated time to completion (can go negative which indicates a slower than usual prep time, and a likelihood of the meal finishing). The selection of these buttons will update the meal database queue for the waiter/waitress as well, so that they can see which meals are ready for pickup.

Omar and Kanav:

Completed tasks: Created the first draft UI for the menu page which includes both the menu and bill.

Current tasks: Exploring ideas on how to organize the menu in the UI by categories.

Future tasks: Add more functionalities for different users which include:

- Online employee portal which handles scheduling tasks (add, remove w/ reason, swap, etc)
 - Profit/Loss tracking with database
-

References:

<http://www.ece.rutgers.edu/~marsic/books/SE/projects/Restaurant/2013-g4-report3.pdf>

http://www.ece.rutgers.edu/~marsic/books/SE/book-SE_marsic.pdf

http://en.wikipedia.org/wiki/User_story

<http://www.ece.rutgers.edu/~marsic/books/SE/projects/Restaurant/2014-g4-report3.pdf>

<http://www.ece.rutgers.edu/~marsic/books/SE/projects/Restaurant/2013-g1-report3.pdf>

UML Design: gliffy.com

<http://www.ece.rutgers.edu/~marsic/Teaching/SE1/report1-appA.html>
