



ASHESI

ASHESI UNIVERSITY COLLEGE

E-COMMERCE FOR CANTEEN SERVICES

APPLIED PROJECT

B.Sc. Management Information Systems

GiftY Yaa Matekuor Mate-Kole

2017

ASHESI UNIVERSITY COLLEGE

E-Commerce For Canteen Services

APPLIED PROJECT

Applied Project submitted to the Department of Computer Science,
Ashesi University College in partial fulfilment of the requirements for the award
of Bachelor of Science degree in Management Information Systems

GiftY Yaa Matekuor Mate-Kole

April 2017

DECLARATION

I hereby declare that this Applied Project is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature:

.....

Candidate's Name:

.....

Date:

.....

I hereby declare that preparation and presentation of this Applied Project were supervised in accordance with the guidelines on supervision of Applied Project laid down by Ashesi University College.

Supervisor's Signature:

.....

Supervisor's Name:

.....

Date:

.....

ACKNOWLEDGEMENT

I would first like to express my sincere gratitude to my supervisor, Mr. Kwadwo Gyamfi Osafo-Mafo who showed a lot of enthusiasm with my topic, steered me in the right direction and was always helpful anytime I ran into trouble.

I would also like to thank my family and friends whom I bounced my ideas off of to get feedback, encouraged me and helped me develop my topic.

ABSTRACT

This project is about creating an online ordering system for the canteens in Ashesi University College. In Ashesi, there are two canteens which serve a population of about 826 people. This puts pressure on the canteens causing the customers to wait for a long time when ordering food. The proposed system is an online ordering system which would allow the students and staff of Ashesi University College to order their food online. This paper also talks about the back end features the canteens would use to process the orders. The system would also help the canteens improve their services by providing the managers of the canteens with reports and reviews. The system would be a web application so it would need internet to work.

TABLE OF CONTENTS

DECLARATION	i
ACKNOWLEDGEMENT	ii
ABSTRACT	iii
Chapter 1: Introduction.....	1
1.1 Problem Statement.....	1
1.2 Objectives	2
1.3 Benefits of the system.....	2
1.4 Limitations of the system.....	3
Chapter 2: Literature Review.....	4
2.1 PDA based system	4
2.2 QOrder	5
2.3 Electronic menu card system	5
2.4 Online Ordering System	5
Chapter 3: Requirements Specification	7
3.1 Use case Diagrams.....	7
3.2 Functional Requirements	9
3.3 Non-Functional Requirements	10
3.3.1 Usability.....	10
3.3.2 Security	10
3.3.3 Availability	11
3.3.4 Portability	11
3.4 System Interface	11
3.4.1 User Interface.....	11
3.4.2 Software Interface.....	12
Chapter 4: Methodology & Design Specification.....	13
4.1 System Architecture.....	13
4.2 ER Diagram	14
4.2.1 Enterprise Rules.....	14
4.3 Page Flow Diagrams.....	15
Chapter 5: Implementation	18
5.1 Development Tools.....	18
5.1.1 Database.....	18

5.1.2 Web Technology.....	18
Chapter 6: Results and Testing	19
6.1 Unit Testing	19
6.2 Integration Testing.....	21
6.3 Results.....	26
Chapter 7: Conclusion and Future Work	27
7.1 Equipment Needed to Implement the System.....	27
7.2 Impact of Project on the Ashesi Community and Canteens.....	27
7.3 Future Work.....	28
Bibliography	29

Chapter 1: Introduction

The Oxford dictionary defines Electronic Commerce as the commercial transactions done electronically on the internet (Oxford Dictionaries, 2017). This includes all activities conducted electronically on the internet that businesses use to support their hiring, planning, buying, selling and other business activities (Schneider, 2015). There are about 3.773 billion internet users in the world now which has greatly influenced the number of people buying via e-commerce which was 1.61 billion people in January 2017 (Digital in 2017: Western Africa , 2017). The food industry grasped on to this trend to improve their services. These days, people in the food industry sell food, write reviews and advertise using the internet through blogs, vlogs and websites.

1.1 Problem Statement

In Ashesi University College there are two canteen services namely, Akorno catering services and Big Ben catering services which provides the students and staff with food. Based on a population census done in 2015, the student population size was 679 and the staff population size is also about 147 (Ashesi University College, 2016). In total, the canteen services serve about 826 people. Looking at these numbers, you would see that there would be a lot of pressure on the canteen services.

With the present system now, when ordering food from Akorno and Big Ben, you have to join a queue to place your order and then stand in line again to be served your food. Usually, the queues to order food at both canteens are long especially during peak hours like 12 pm and 1 pm. The people taking the orders sometimes get it wrong and changing your order is another tedious process.

One of the previous catering companies, Mannies Catering services tried introducing phone orders but this did not help alleviate the problem. Some of the problems you would face with this system are: customers do not have a physical menu so the ordering staff would have to repeat the menu to every customer, there might not be enough staff to man the phones, and it is more likely that they would get your order wrong. The present canteen services, have also tried tackling this problem by having two different queues for people on the meal plan system and those paying with cash. This eased the problem a bit.

1.2 Objectives

The objective of this project is to create an online ordering system which would allow students and staff of Ashesi University College to view the menu of the canteen services in the school online and place their orders.

- Reduce the time spent in queues when ordering food.
- Enable the management of canteens make useful decisions to improve their services from reviews and reports generated.
- Help customers decide on what food to buy.
- Ensure that the right orders are placed.
- Provide customers with an up to date menu.

1.3 Benefits of the system

This system comes with many benefits. One advantage of this system is that, it would reduce the long queues because customers would not need to be physically present when ordering their food. Customers would also have a visual confirmation that their orders were placed correctly. Another advantage is that it would ease the pressure on the canteen services because all they would have to do is accept the customer's order, send it to the kitchen and

alert the customer when the food is ready. The food reviews can also help customers prevent food wastage. The canteen services would also have reports and charts which would help them manage their inventory and make other useful decisions.

1.4 Limitations of the system

- Users would need internet connection to be able to use the system.

Chapter 2: Literature Review

Most restaurants and other food services have tried improving their efficiency by reducing the wait time of customers in ordering food. They have embraced technology and tried to use it to improve their services. Some systems that have been used are PDA based systems, QORDER and electronic menu card systems.

2.1 PDA based system

With this system there are small and portable personal digital assistants made available to customers in which they key in their orders. Their orders are then sent to the kitchen to be processed. The waiters have to go round collecting the PDAs when the customers are done ordering so that it would be available for other customers. The PDA based system is better than the manual ordering process and reduces the risk of employees of restaurants and food services getting orders wrong. However this system has some limitations.

- Expenditure costs are increased because a lot of PDAs would have to be provided for the customers especially during busy hours (Tanpure, Shidankar, & Joshi, 2013).
- Customers cannot make their orders before they get to the restaurant, they have to be physically present because the PDAs are only available in the restaurant (Samsudin, Khalid, Kohar, Senin, & Nor , 2011).
- The PDAs show only text so customers do not get to see what the food looks like before ordering (Samsudin, Khalid, Kohar, Senin, & Nor , 2011).
- The PDA based system is also unhygienic because customers have to share the PDAs and any diseases can be passed on easily (Tanpure, Shidankar, & Joshi, 2013).

2.2 QOrder

QOrder is a portable ordering system which can be installed on any Android device and was created by QUORiON Data Systems. With this system, the waiter takes customers' orders with a hand held device with QORDER installed on it. When the waiter takes the orders, it is sent to the kitchen for processing and then the waiter processes the customers' payment on the hand held device and prints the receipt out on the belt printer (How it Works, 2017). The software needs WI-FI to be able to communicate with other points like the kitchen. QOrder makes the ordering and payment processes faster. The limitations of this system are similar to that of the PDA based system. Just like the PDA based system, customers cannot order from their homes or workplaces and expenditure costs will be high because waiters would have to be provided with handheld devices.

2.3 Electronic menu card system

In the International Journal of Research in Advanced Engineering Technologies, there was an article written about an electronic menu card for restaurants. The author's project is an automated menu system in restaurants which consists of a touch screen sensor, speech recognition module and LCD (SHALINI & SUKUMAR, 2014). There will be screens placed on the tables which would display the menu and allow the customers to make orders. Apart from the touchscreen, the user can make orders using speech commands.

2.4 Online Ordering System

This is a system that allows customers to order their food online via browsers on their devices. This solves the problem of customers being physically present in the restaurant before they can order their food. This system became recognized when the number of internet users increased. The customers make their orders online, make payments and choose whether

they want the food delivered or not. Domino's pizza in the UK has been able to increase their sales with online ordering. They have an app which has been downloaded more than ten million times. The chief executive of Domino's attributed their success in the UK to the investment made in their e-commerce initiatives. Seventy-seven percent of their orders are now made online (Jamieson, 2015). Other food services like McDonalds have caught on to the benefits of e-commerce. They have started testing their mobile ordering and payment system which they intend to launch in the fourth quarter of 2017 (Perez, 2017). In Ghana, Jumia Food provides online food ordering to customers who have the options of choosing from about 90 restaurants. The system I am proposing for the canteens in Ashesi University College is an online ordering system similar to these systems. The canteens have different ways they operate so the system would be created according to their needs to give employees of the canteens a smooth sail when using the system.

Chapter 3: Requirements Specification

The users of the online ordering system are the students, staff and canteen employees. The canteen employees will be grouped into two; manager i.e. owner of canteen and other employees. There would also be an administrator in charge of managing the canteens' system. The requirements below were gathered by observing the activities that goes on when ordering food for both the canteens and the students and staff and a few students were also spoken to.

3.1 Use case Diagrams

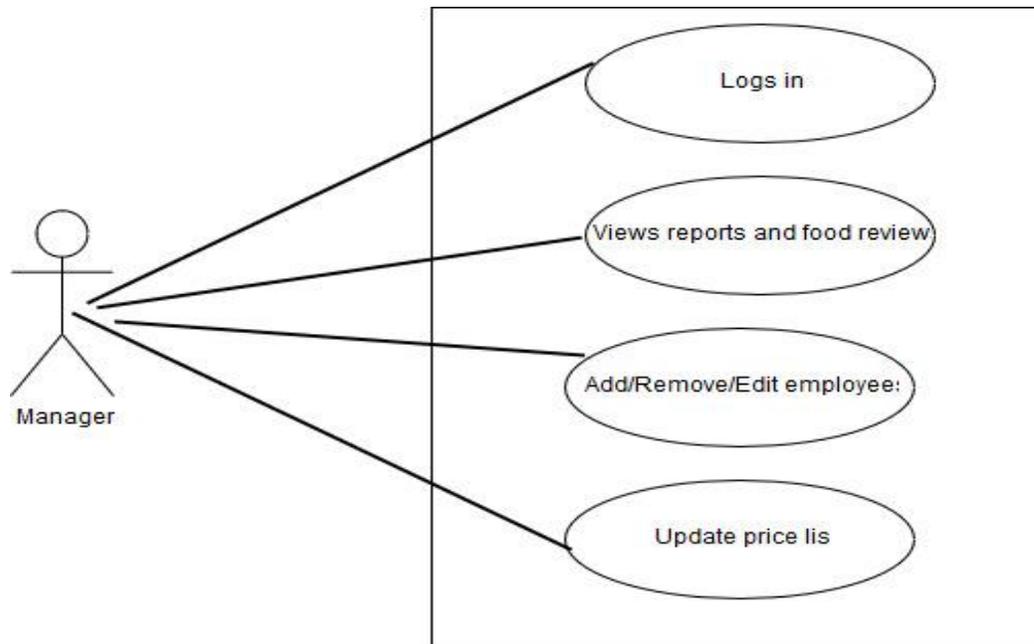


Figure 3.1: Use case diagram for manager of canteens

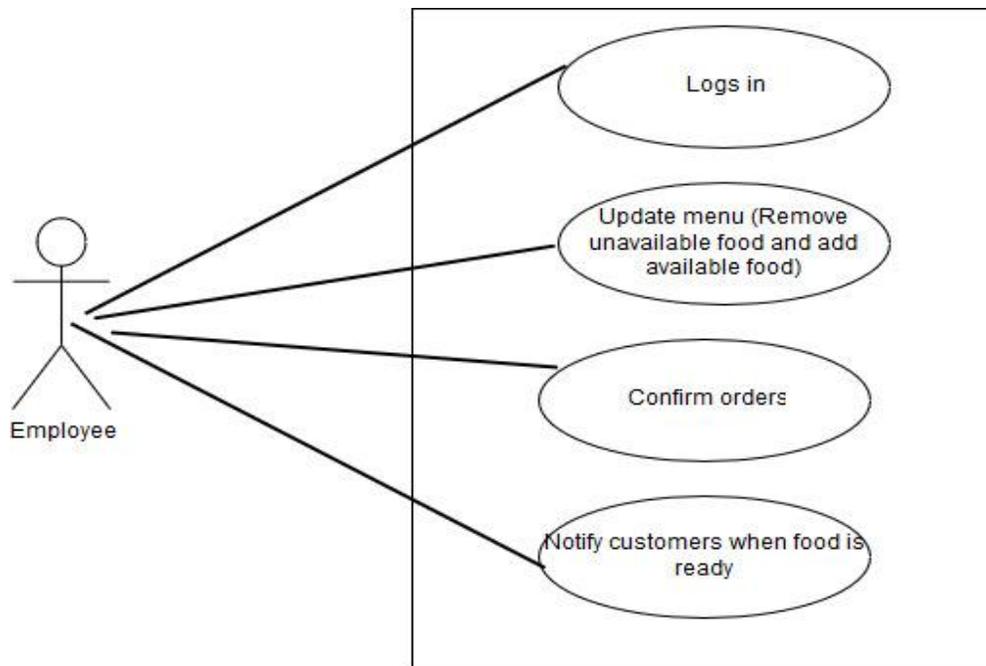


Figure 3.2: Use case diagram for employees

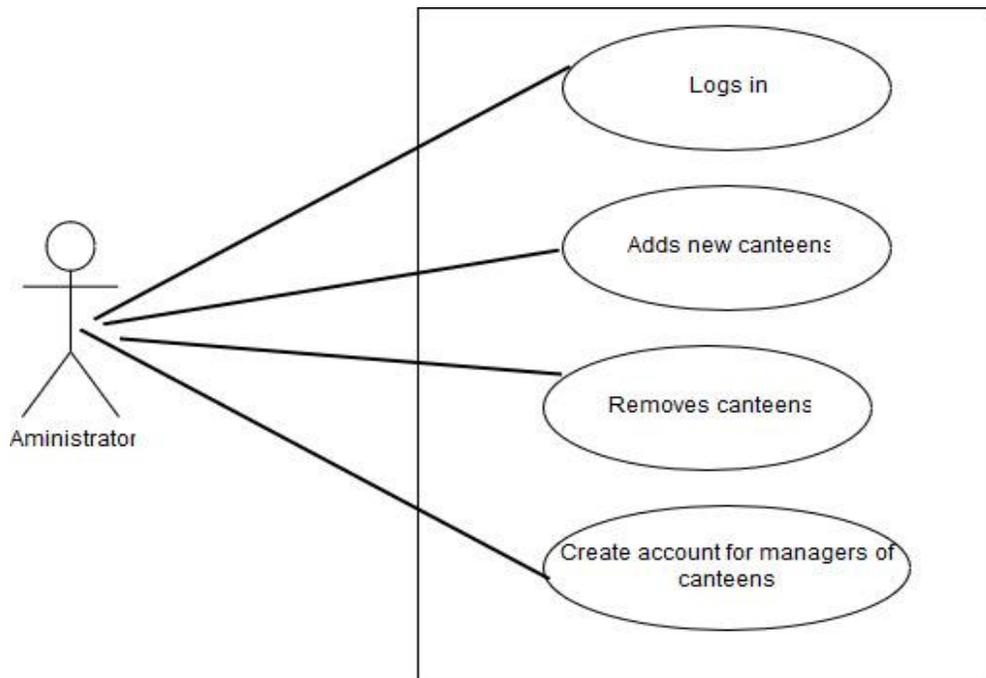


Figure 3.3: Use case diagram for administrator

3.2 Functional Requirements

Staff and students:

- The user should be able to create an account
- The user should be able to log in to the system
- The user should be able to display the menu of canteens available
- The user should be able to add food items to cart
- The user should be able to remove items from current order
- The user should be able to confirm their order
- The user should be able to select from payment options
- The user should be able to give feedback on the food
- The user should be able to get a notification when their order is ready

Employees of canteen:

- The employees should be able to log in to the system
- The employees should be able to add or delete food items from the menu
- Add/Update/Delete description of food items from the menu
- The employees should be able to display orders
- The employees should be able to confirm a customer's order
- The employees should be able to notify the customer when food is ready
- The employees should be able to remove processed orders from list of unprocessed orders

Manager of canteen:

- The managers should be able to add and remove employees from the system
- The managers should be able to update the prices of the food
- The managers should be able to view food reviews
- The managers should be able to view reports
- The manager should be able to receive reports at the end of the day in a pdf format via email every day.

Administrator:

- The administrator should be able to add new canteens
- The administrator should be able to create accounts for the managers of the canteens
- The administrator should be able remove canteens from the system

3.3 Non-Functional Requirements

3.3.1 Usability

- The system would have tooltips to help users know how to use it
- The web pages in the system would have a uniform look
- The system would have images for every food item
- 95% of the users would be able to use the system on the third attempt without any assistance.

3.3.2 Security

- The system's database will be made accessible to only authorized users

- The passwords of all users will not be displayed in text but in special characters

3.3.3 Availability

- Any maintenance work done on the system will be done after work hours of canteens

3.3.4 Portability

- The system would work on any device as long as the device has access to internet connection

3.4 System Interface

3.4.1 User Interface

The user interface of the browser will be compatible with any browser and would be implemented using HTML and materialize. The user interface for regular employees of the canteens would have a navigation bar on the left which would direct them to the home page, add food page, menu page and the orders page. The interface for the manager would also have a navigation bar on the left which directs them to these pages; dashboard, employee management page, price list page and reviews page. The user interface for the administrator of the whole system has a page with cards which redirects the administrator to the various page and breadcrumbs to help with easy navigation.

3.4.2 Software Interface

The online ordering system will be created using PHP, SQL and HTML. Google Charts will be used to generate reports for the manager's side to help them track food items that have been bought and Firebase Cloud messaging would be used to notify customers when the food is ready.

Chapter 4: Methodology & Design Specification

The waterfall model was used to create the online ordering system. The waterfall model was used because of the documentation it requires at every stage which could be beneficial in the future. This model also ensures that all phases are completed before moving on to another phase. This reduces the risk of having incomplete phases. This chapter focuses on the methodology and design specification of the system the canteens would use and the administrator side.

4.1 System Architecture

The online ordering system would have client-server architecture and would require internet connection for the system to work. The database and web services would be hosted on a server so the user would have to send a request to the server and wait for the response.

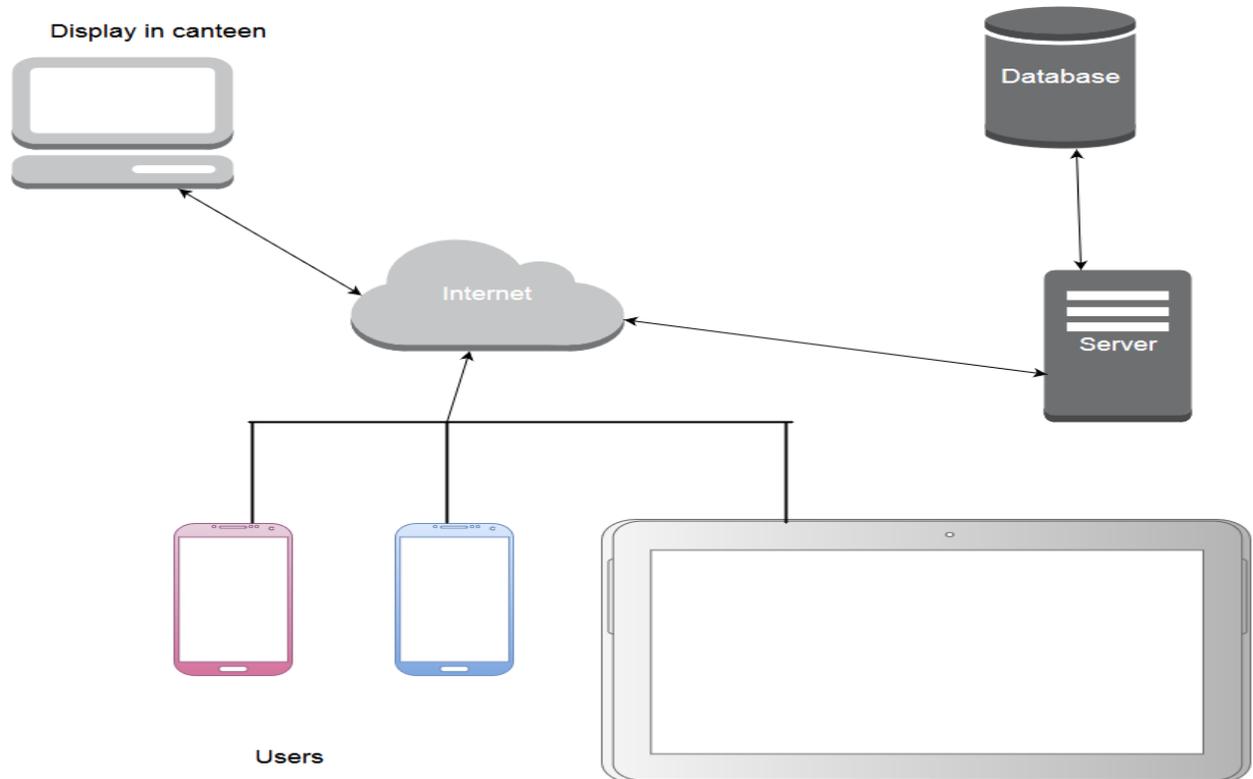


Figure 4.1: System Architecture

4.2 ER Diagram

The figure below shows the tables that will be implemented in the database for the system to be functional.

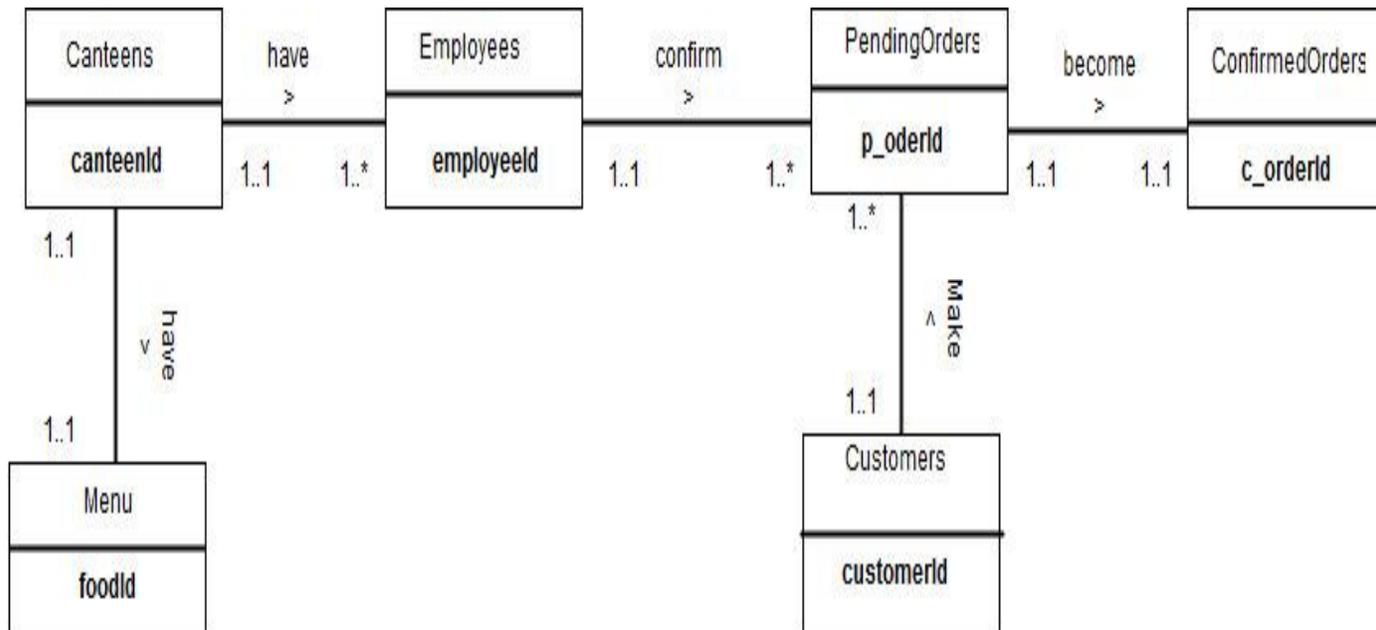


Figure 4.2: ER Diagram

4.2.1 Enterprise Rules

The relationships between the tables are described below:

- A canteen has one or more employees
- An employee works in exactly one canteen
- A canteen has exactly one menu
- A menu belongs to exactly one canteen
- An employee confirms one or more pending orders
- A pending order is confirmed by exactly one employee
- A customer makes one or more orders
- An order is made by exactly one customer

4.3 Page Flow Diagrams

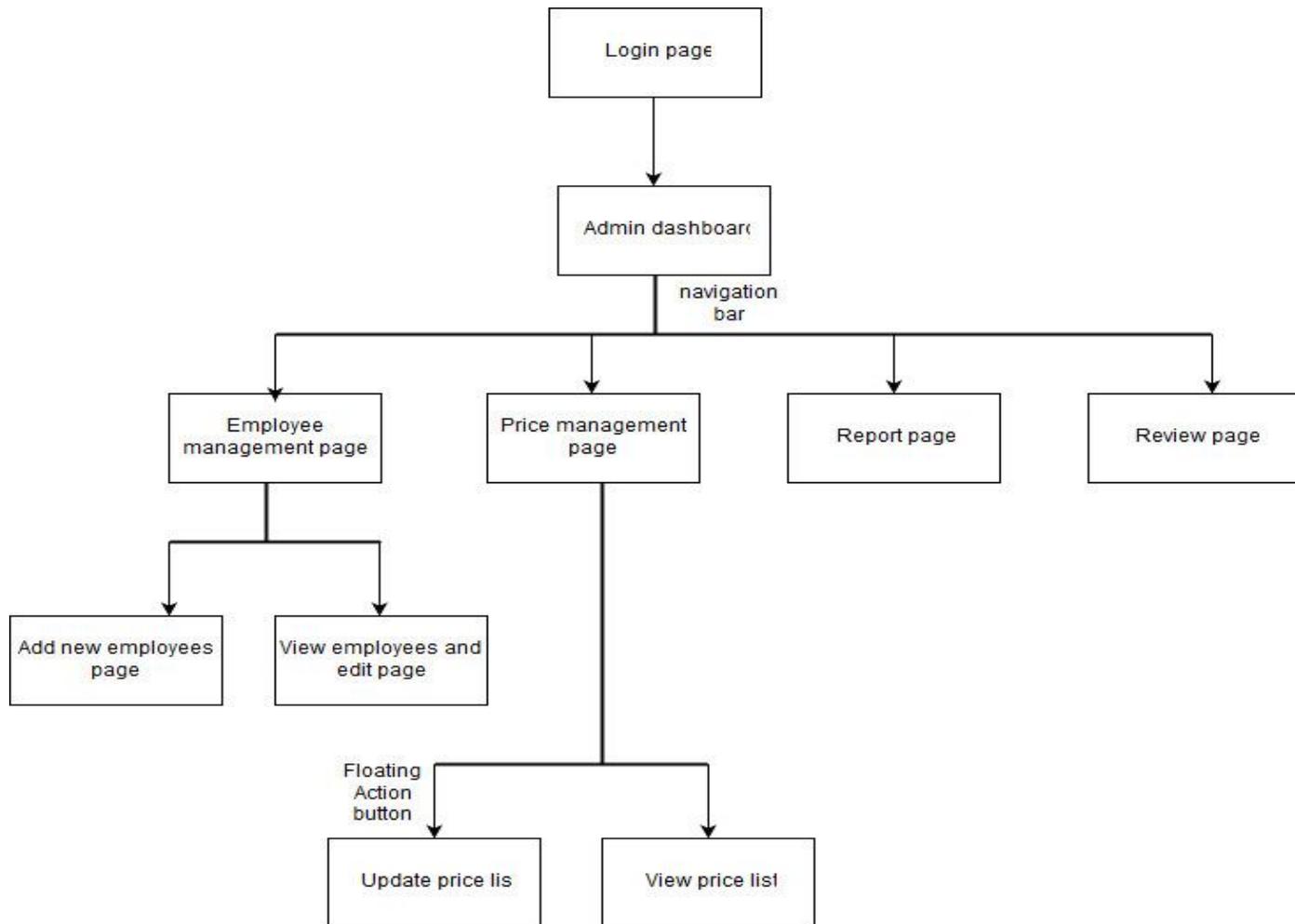


Figure 4.3: Manager side page flow

The page flow diagram above shows the various pages the manager has access to and how they are linked. The navigation bar which redirects the manager to the employee management page, price management page, report page and review page appears on every page to help the user easily navigate.

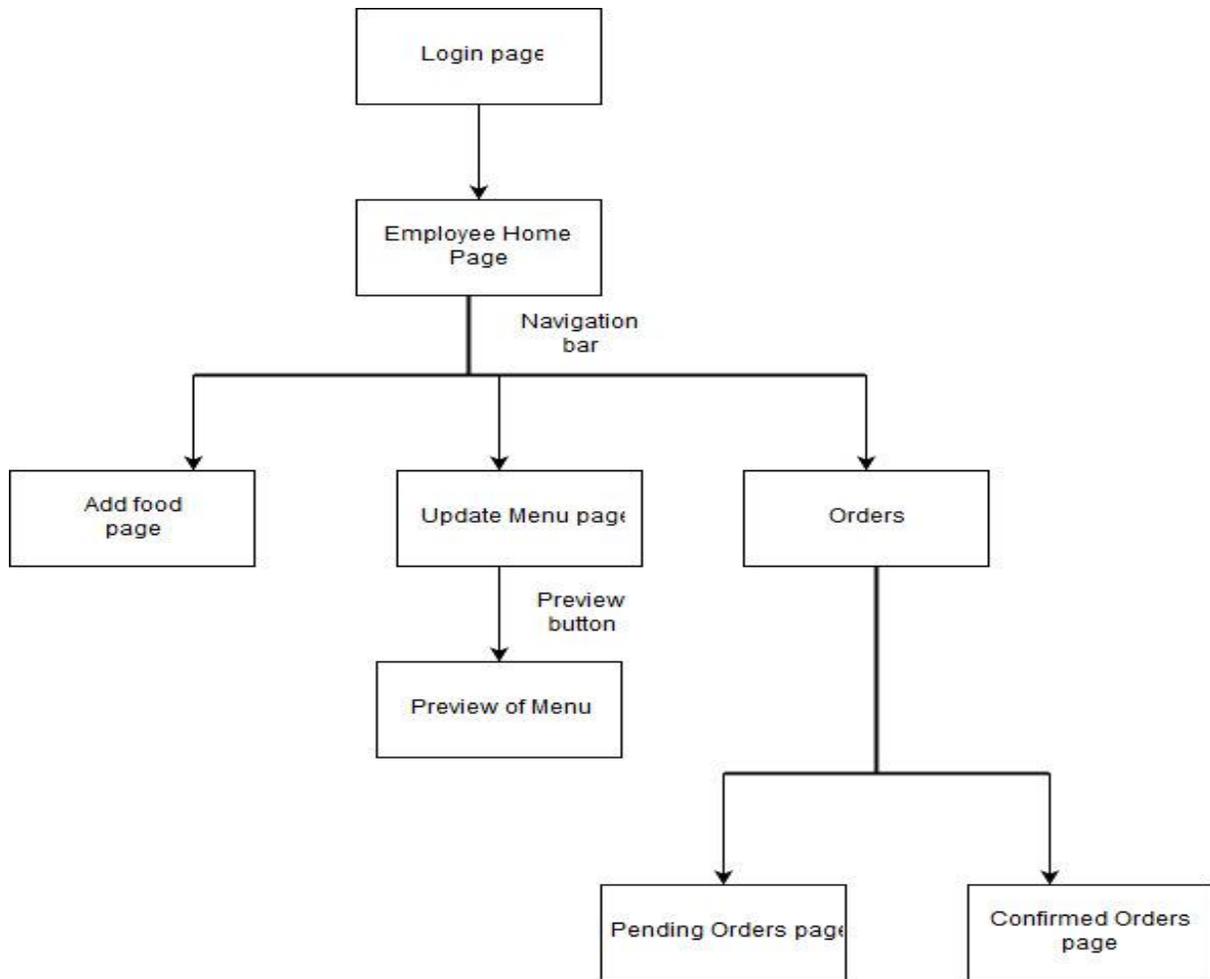


Figure 4.4: Employee page flow

The navigation bar which redirects the employees to the add food page, update menu page, report page and orders page appears on every page to help the employee easily navigate.

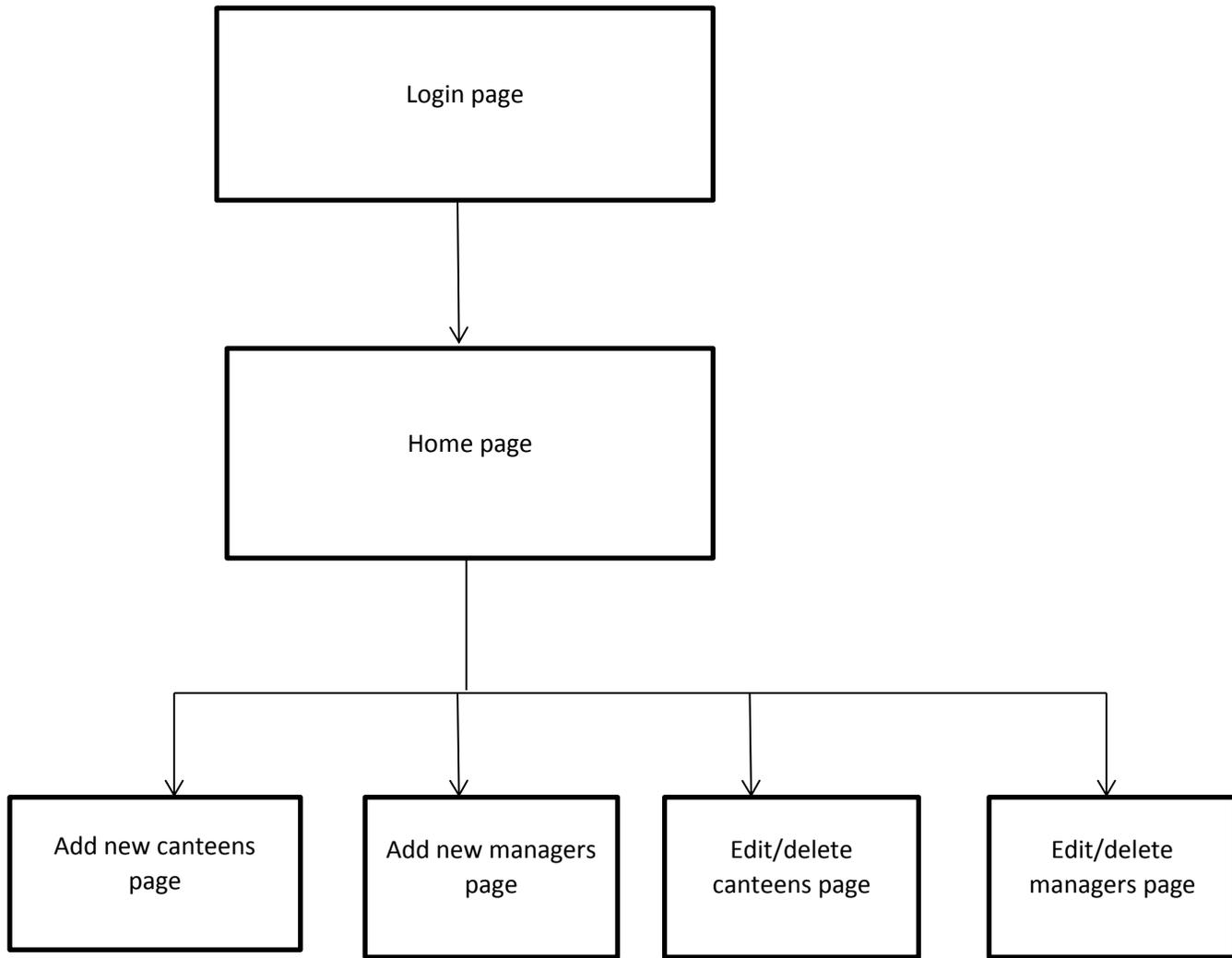


Figure 4.5: Administrator page flow

Chapter 5: Implementation

5.1 Development Tools

5.1.1 Database

The online ordering system would need a database to store all the order details, customer details and employee details to be able to work effectively. MySQL would be used to implement the database. MySQL was used because installation and setup is a simple task, it is open source and also inexpensive to maintain. MySQL Workbench would be used as the graphical user interface to make developing the database simple.

5.1.2 Web Technology

The online ordering system is a web application so to implement it the XAMPP web server was used. XAMPP web server is an Apache web server which comes with MariaDB, PHP, Perl and MySQL database (Apache Friends, 2017). XAMPP was used because it is easy to install. The programming language which will be used to create the system is PHP. PHP comes with many advantages. The first being, it is open source and free and does not need any expensive software. PHP supports all the major browsers and this is essential to the system since a wide range of people are going to use it. PHP also has a security layer to protect against viruses and threats (Top 10 Benefits of Using PHP in Web Development, 2015). Materialize CSS framework is used to make the user interface attractive and interactive. To create the charts for the report page on the manager's side, Google Charts will be used since it has various options. Firebase Cloud Messaging would also be used to send notifications to users. Fpdf would be used to create pdfs to send reports via email to managers.

Chapter 6: Results and Testing

To ensure that the system works as it is supposed to, unit testing and integration testing were done to check it.

6.1 Unit Testing

Table 6.1: Unit test for adding an employee

Test	Input	Expected Result	Result
Add an employee with the required details	Required details	Employee added successfully	Employee added successfully
Add an employee without giving any details	Blank Fields	Alert saying fill in the required fields	Alert saying fill in the required fields

Table 6.2: Unit test for login

Test	Input	Expected Result	Result
Login with correct username, password and specify canteen	Username, password and name of canteen	Login successful	Login successful
Login with wrong username, password and specify canteen	Wrong username, correct password, right canteen	Login unsuccessful	Login unsuccessful
Login with correct username, wrong password and specify canteen	Correct username, wrong password, right canteen	Login unsuccessful	Login unsuccessful
Login with correct username, correct password and wrong canteen	Correct username, correct password, wrong canteen	Login unsuccessful	Login unsuccessful
Password recovery	email	Link sent to email to change password	Link sent to email to change password

Table 6.3: Unit test for adding food

Test	Input	Expected Result	Result
Add food with the required details	Name, description, category, picture	Successfully added	Successfully added
Add food without the name given	Description ,category, picture	Adding unsuccessful	Adding unsuccessful

Table 6.4: Unit test for updating menu

Test	Input	Expected Result	Result
Add food to the menu	Press the add button	Food is added to the menu	Food is added to the menu
Remove food from the menu	Press the remove button	Food is removed from the menu	Food is removed from the menu
Add the same food more than once to the menu	Press the add button	Add button is disabled once the food has already been added	Add button is disabled

Table 6.5: Unit test for editing food

Test	Input	Expected Result	Result
Edit name, category and description	Name, category, description	Successfully Edited	Successfully Edited
Edit name of food after customer places an order	Name of food	Customer's order remains the same	Customer's order changes

Table 6.6: Unit test for editing price

Test	Input	Expected Result	Result
Edit meal type, description and price	Meal type name. description, price	Successfully Edited	Successfully Edited
Edit price when food	Price	Price of food changes	Price of food changes

is displayed on menu		on menu	on the menu
----------------------	--	---------	-------------

Table 6.7: Unit test for notifying customers

Test	Input	Expected Result	Result
Notify customers when food is ready	Press the ready button	A notification is sent to the customer	A notification is sent to the customer

Table 6.8: Unit test for adding canteens and admins to the system

Test	Input	Expected Result	Result
Add new canteens to the system	Name of canteen	Canteen added successfully	Canteen added successfully
Create admins for new canteens	Name, email and canteen they belong to	Admin added successfully	Admin added successfully

6.2 Integration Testing

After the various modules of the system were tested, the modules were integrated to make sure they work well together.

Table 6.9: Integration Testing

Test	Description	Expected Result
Link between employee login to home page.	Employee logs in with the required login details and presses the login button.	Directed to the home page shown in Figure 6.1.
Link between home page and add food page, menu page and orders page	Employee clicks on the links he or she wants to go to on the navigation bar on the left as shown in Figure 6.1.	Employee is directed to the add food page, menu page or orders page depending on which page he or she wants to visit.
Link between manager login and dashboard	Manager logs in with the required login details and	Manager is directed to the dashboard shown in Figure

	presses the login button.	6.2.
Link between dashboard, employee management page, price page and Food Reviews page	Manager clicks on the links he or she wants to go to on the navigation bar on the left as shown in Figure 6.2.	Manager is directed to the dashboard, employee Management page, price page and Food Reviews page depending on which page he or she wants to visit.
Link between employee management page and add employees page	Manager clicks on the image or floating action button to add employees on the employees management page shown in Figure 6.3.	Manager is directed to the add employees page shown in Figure 6.4.
Link between employee management page and view list of employees page.	Manager clicks on the image to view employees on the employees management page shown in Figure 6.3.	Manager is directed to the view employees page shown in Figure 6.5.
Link between administrator login page and navigation page	Administrator logs in with the required login details and presses the login button.	Directed to the navigation page shown in Figure 6.6.
Link between navigation page and add canteens page, add admins to canteens page, view list of canteens and view list of admins.	Administrator clicks on the links he or she wants to go to on the navigation page shown in Figure 6.6.	Administrator is directed to the add canteens page, add admins to canteens page, view list of canteens and view list of admins pages.



Figure 6.1: Home page for employees

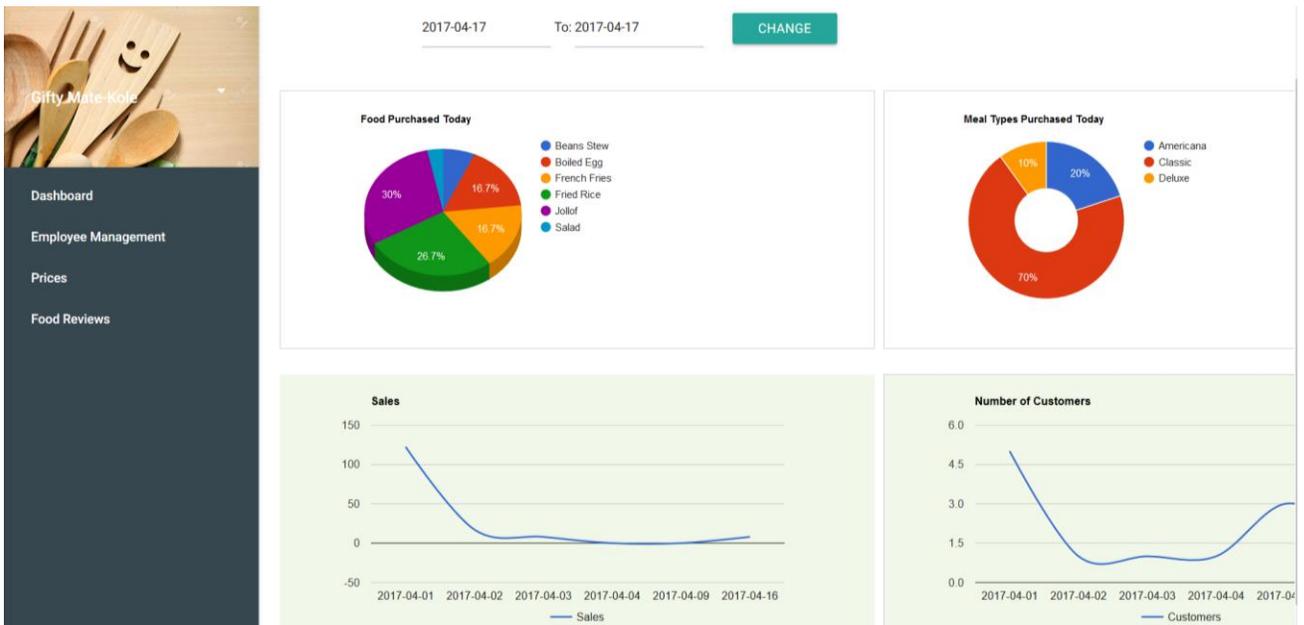


Figure 6.2: Dashboard for Manager



Figure 6.3: Employee management page

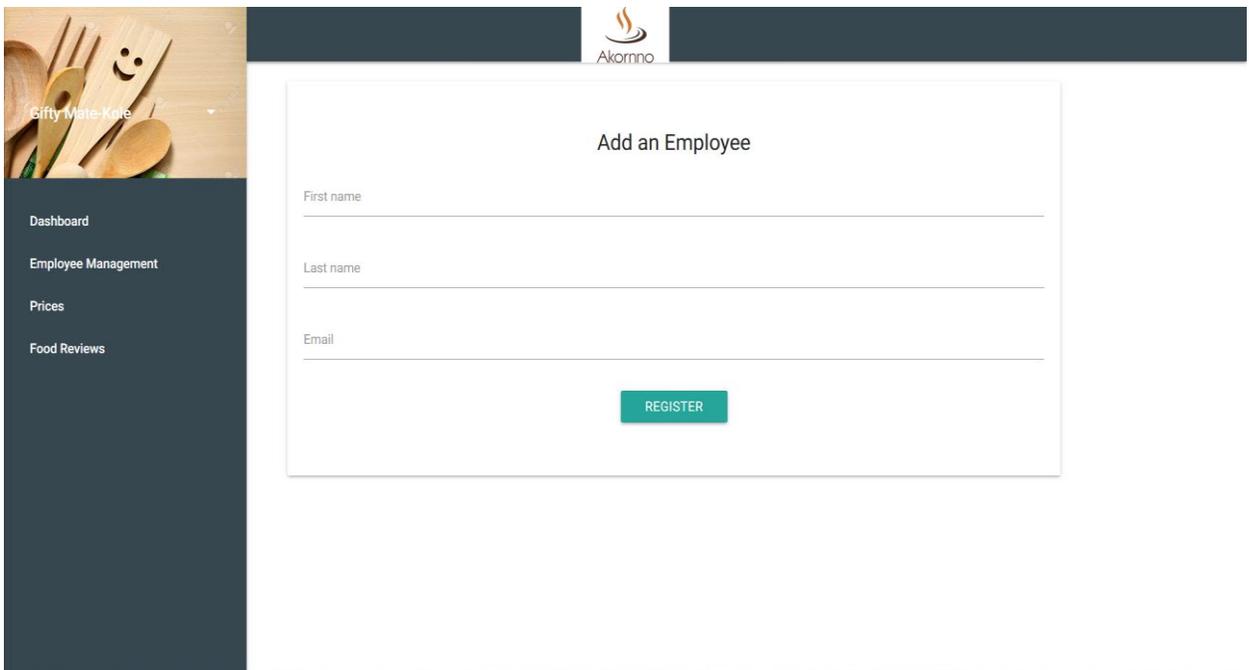


Figure 6.4: Add Employee page

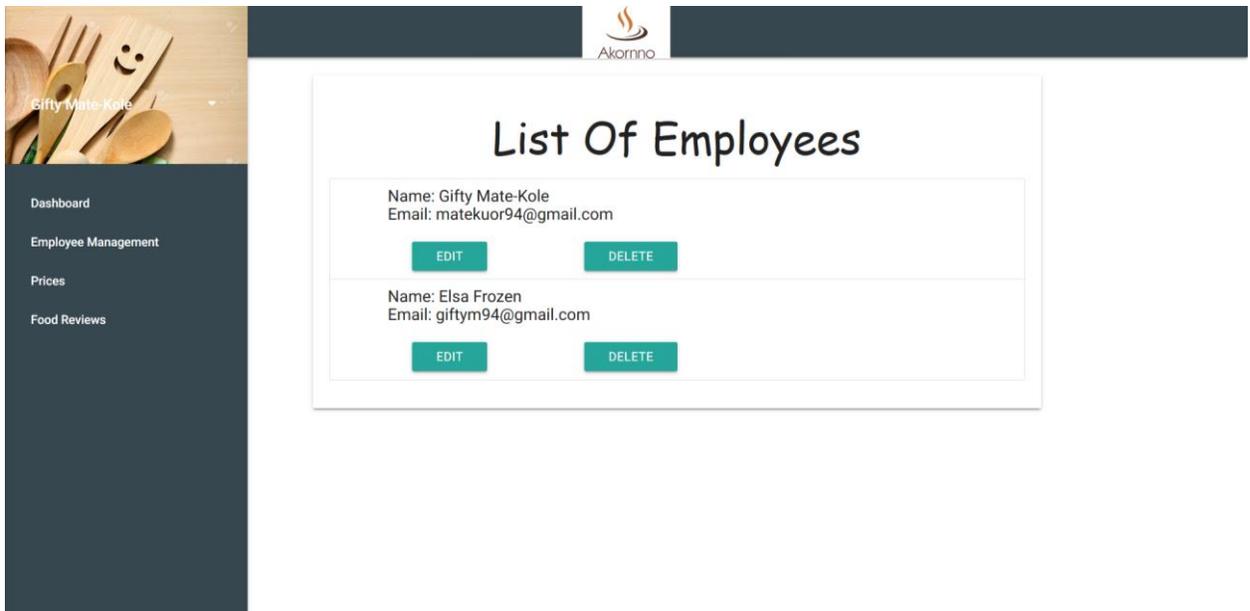


Figure 6.5: View list of Employees page



Figure 6.6: Navigation page for Administrator

6.3 Results

After testing the system, it was confirmed that it met its functional requirements. A major drawback of the system is its dependence on the internet to function smoothly. Without good internet connection some of the functionalities that will not work are: customers and canteens would not be able to receive notifications and the manager would not be able to view the reports.

Discussions about how the system would work were had with the managers of both canteens. The manager of Akorno had one problem with the system which is that they would not have enough space to keep the ordered food until they would be picked up. The manager of Big Ben liked the system however; he also had a problem which is that when people cancel their orders and do not come and pick up, it would be a loss for them.

Chapter 7: Conclusion and Future Work

7.1 Equipment Needed to Implement the System

The managers of the canteens were interviewed and were willing to accept this system as long as it would help reduce pressure on the canteens and provide other beneficial services. To implement this system for the canteen services, they would need a display system which is a computer and would also need access to the internet.

7.2 Impact of Project on the Ashesi Community and Canteens

Operations management is important to the success of every business because it involves handling the processes to produce and distribute products and services. These processes include inventory control, quality control, storage, evaluation of processes and distribution (McNamara, 2017). The main aim of operations management is to make these processes efficient and effective. This project handles more than one aspect of operations management in the canteens which are distribution, inventory management and evaluation of processes.

The online ordering system introduces another form of distribution for the canteens which is online retailing. Online retailing can benefit the canteens in various ways. The online ordering system can help the canteens reach many more students and staff especially students who are off-campus. They would not be deterred by the long distance to order food any more. It would also help canteens keep track of product information through customers' interests or choices and reviews customers leave. The reports generated by the system would also help the canteens manage their inventory better. For instance, when the canteens find out which food is purchased the most from the reports, they might decide to increase the production of the

food. The system also creates convenience for students and staff since they do not have to walk to the canteens to view menus and order and would also reduce queues at canteens.

7.3 Future Work

- Implement a sms notification system to notify customers when food is ready to substitute the Firebase Cloud Messaging when there is no internet connection.
- Display food ordered every thirty minutes to help the canteens know when to cook more food to prevent shortages.

Bibliography

(2017). Retrieved March 24, 2017, from Oxford Dictionaries:

<https://en.oxforddictionaries.com/definition/us/e-commerce>

Apache Friends. (2017). Retrieved April 17, 2017, from Apache Friends:

<https://www.apachefriends.org/index.html>

Digital in 2017: Western Africa . (2017, January 26). Retrieved March 24, 2017, from

SlideShare: <https://www.slideshare.net/wearesocialsg/digital-in-2017-western-africa>

How it Works. (2017). Retrieved 3 21, 2017, from quorion: [https://www.quorion.com/pos-](https://www.quorion.com/pos-software/portable-ordering-system-restaurants.htm)

[software/portable-ordering-system-restaurants.htm](https://www.quorion.com/pos-software/portable-ordering-system-restaurants.htm)

Jamieson, S. (2015, July 28). *Domino's sales climb as customers order pizza by app*.

Retrieved March 22, 2017, from The Telegraph:

<http://www.telegraph.co.uk/finance/newsbysector/epic/dom/11767078/Dominos-sales-climb-as-customers-order-pizza-by-app.html>

McNamara, C. (2017). *Operations Management*. Retrieved April 17, 2017, from Management

Help: <http://managementhelp.org/operationsmanagement/>

Perez, S. (2017, March 15). *McDonald's begins testing Mobile Order & Pay ahead of*

nationwide launch. Retrieved March 22, 2017, from Techcrunch:

<https://techcrunch.com/2017/03/15/mcdonalds-begins-testing-mobile-order-pay-ahead-of-nationwide-launch/>

Samsudin, N. A., Khalid, S. K., Kohar, M. F., Senin, Z., & Nor, M. (2011). A customizable wireless food ordering system with. *IEEE Symposium on Wireless Technology and Applications*.

Schneider, G. P. (2015). *Electronic Commerce*. Cengage Learning.

SHALINI, K., & SUKUMAR, N. (2014). ELECTRONIC MENU CARD FOR RESTAURANTS. *International Journal of Research in Advanced Engineering Technologies*.

Tanpure, S., Shidankar, P., & Joshi, M. M. (2013). Automated Food Ordering System with Real-Time Customer Feedback. *International Journal of Advanced Research in Computer Science and Software Engineering*.

Top 10 Benefits of Using PHP in Web Development. (2015, June 11). Retrieved March 24, 2017, from eliteinfoworld: <http://www.eliteinfoworld.com/blog/top-10-benefits-using-php-web-development/>