Lebrew Foodhouse: POS System with KIOSK and Online Ordering with Data Forecasting Using Time Series Forecasting

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CHAPTER I

INTRODUCTION

1.1 INTRODUCTION

This project is aimed at designing a sophisticated and modern Information Technology-based point of sale system-POS system for Lebrew Foodhouse. This system will include self-service KIOSKS, an online ordering system, data forecasting and analysis, hence making it easy for both the customers and the staff. With the help of these tools, Lebrew Foodhouse intends to improve its operations and customer interaction while enhancing the ability to make profitable and efficient management decisions based on data.

Self-service KIOSK stands as one of the main elements of such systems. Customers can make orders through such a system while in the store without the help of any attendant. The kiosk, being a simple interactive device, helps in minimizing the waiting period by enabling the customers to look through the menu, personalize their orders, pay to the cashier, and when urged to do so, without the intervention of any member of the staff. This is an added advantage to customers but does not compromise the quality-of-service delivery as the employees of Lebrew Foodhouse are able to concentrate on service provision and improvement of the in-store atmosphere.

Adding the feature of an online ordering service for customers also increases customer satisfaction as they can order from anywhere at their own time. This feature helps to localize Lebrew Foodhouse to more than its physical location and therefore reaches a bigger market and fulfills the rising urge for ordering foods digitally. Online orders are efficiently organized within the restaurant's POS system assuring that online orders are no different from the orders made from within the premises. It encourages cohesiveness in service delivery, which enhances customer loyalty since customers can receive the same standard of service whether they choose to order in advance or walk into the restaurant.

In support of the sales and operations planning process, the POS also has a data forecasting system, Time Series Forecasting, and helps Lebrew Foodhouse with sales forecasts as well as estimating future inventories. By capturing information on customer demand and the sales of specific items, the system will assist management in pre-emptive stock adjustment, minimizing losses and ensuring the availability of fast-selling products. This aspect of the system enables appropriate stock management to be practiced, whereby supply is dependent on the demand expected so that there is no waste and the business can achieve its goals.

The sales forecast feature enables Lebrew Foodhouse to make operational changes in consonance with sales fluctuations, aiding strategic planning. As an

illustration, such a system can, when it is busy or certain stocks are in high demand, inform the need for extra input or even extra hands, improving the operations of the enterprise as a whole. Forecasting also assists with the timing of new products or services that may be offered for a limited time, campaigns or advertisements, and the like, thus making the operations of Lebrew Foodhouse customers' oriented. While providing these characteristics, Lebrew Foodhouse POS System also seeks to develop an all-comprehensive management system, which will be relied on data rather than guesswork, for the restaurants. This project will act as a primary structure, which is expected to be built in the coming time, thus making Lebrew Foodhouse an advanced and client-focused business. The goal of this project is primarily to improve on the customer experience by employing cutting-edge technology, and running an efficient, cost-effective and expandable model that is sensitive to current market dynamics.

1.2 PURPOSE

The main goal for using Lebrew FoodHouse system is to simplify and improve all processes in restaurant function to increase traffic and restaurant revenues. To complete the system, a current POS system, self-check, self-service kiosks incorporation, online ordering, and a data forecasting module through time series forecasting were applied in the system. The goal of this project is to better control the flow of orders through the organization, manage stock effectively, and make more accurate sales predictions for the future that will better use resources and create more profitability.

1.3 OBJECTIVES

Lebrew foodhouse wants to improve consumer convenience and streamline sales processes by designing and implementing a point-of-sale system that incorporates kiosk, online ordering, and time series forecasting.

Specifically aims to:

1. To construct a dependable point-of-sale system for effective inventory control and transaction processing.
2. To provide online ordering and kiosks for easy order placing.
3. To use time series forecasting to enhance inventory planning and provide precise sales projections.

1.4 SCOPE AND LIMITATION

Scope:

The project includes creating point-of-sales system that will address the need of Lebrew FoodHouse, to help make sales transactions easier for its employees. There will also be a customer ordering system for quick identification of foods for sale and easy ordering and home delivery services where customers can order food online or through their mobile applications There will also be a time series

forecasting module for predicting sales and inventory needs. There will be a customer database created and developed by the system and the resultant feedback arising from the customers will help build better relations as well as assist in organizational change.

Limitations:

The accuracy and quality of historical data is essential to most of the forecasting methods and must be available. However, there are limitations to this system and project implementation that can limit the efficacy of the system. These consist of the alterations within the system context, for instance, the system software or hardware and external alterations for instance the economic indicators. Such variables affect not only how well the forecasting system will work, but also the total time needed to put the project into practice and for it to become sustainable, why good data handling and flexibility are crucial.

1.5 **ASSUMPTIONS AND DEPENDENCIES**

- **Reliable Internet Connection:** The services within the system also include order placement via the internet, and cloud-based information storage.

- **Google Cloud Integration:** Predictions of data points are made using forecasting methods available on Google Cloud.

- **Staff Training:** The effectiveness of the system is therefore trained regarding the use of POS, kiosk, and online orders.

- **Quality of Historical Data:** The ability to forecast accurately with the forecasting module depends largely on sales and inventory data that is accurate and includes all historical information.

1.6 **Definition of Terms**

POS System: A Point-of-Sale system used for processing sales transactions in restaurants or retail environments.

Self-Service Kiosk: A digital terminal allowing customers to place orders and make payments without human interaction.

Online Ordering System: A system enabling customers to place orders remotely through a website or mobile application.

Data Forecasting Module: A component that uses time series forecasting techniques to predict sales and inventory needs.

Inventory Management: A system feature that tracks stock levels in real-time and notifies when items are low or out of stock.

User Authentication: A security process that verifies a user's identity before allowing access to certain system functions.

Role-Based Access Control: A mechanism that restricts system access based on the user's role (Admin, User).

Order Management System: A feature that handles customer orders, allowing for placement, modification, and tracking of orders.

Menu Management: A system capability that enables the addition, modification, or deletion of menu items and prices.

Reporting Dashboard: A visual tool providing analytics on sales, inventory, and performance metrics.

Google Cloud Services: Cloud-based services used for data storage, processing, and forecasting in the POS system.

Time Series Forecasting: A statistical method used to predict future values based on historical data trends.

User Interface (UI): The space where interactions between humans and machines occur, facilitating user control of the system.

Encryption: A security technique that converts data into a coded format to prevent unauthorized access.

PCI DSS: Payment Card Industry Data Security Standard, which sets requirements for protecting card payment data.

PIPA: Personal Information Protection Act, a data privacy legislation ensuring safe handling of personal data.

CHAPTER II

REQUIREMENTS SPECIFICATIONS

2.1 PRODUCT FEATURES

1. **User Authentication and Role-Based Access Control**

    This Features allows users to work on certain services in the system depending on their level of authority. While Admins have a full right to do everything on the systems, Managers only have rights to generate reports and manage staff, and Staff have rights to manage orders alone. orders are taken and orders can be viewed to see prior orders placed by the customers. It makes sure that users can only perform essential operations, increasing security measures, and protecting data.

2. **Basic Order Management System**

    Doing so is possible through the help of this feature that allows quick orders from customers. Specified by employees or customers, they can place and change orders with relevant orders reflected in the inventory immediately. It speeds up the flow of orders in the food industry by improving order accuracy and decreasing mistakes in all types of sale formats – POS, self-checking terminals, or online platforms.

3. **Inventory Management**

    This feature monitors quantity of stock in restaurants in real time and eliminates stock with each order placed. They also notify the Admin or Manager in case inventory is low meaning the restaurant maintains a good stock without experiencing excess stock. It also assists in supply order management to be made effective.

4. **Menu Management**

    Admins can now add, edit or delete menu items and its products names, price, and availability within this feature. Therefore, it makes sure that the staff and the customers face and identify with the current menu that should reflect the various stock available hence meeting the customer's needs.

5. **Online Ordering System**

    Through this feature customers can access the menu remotely and make orders on the web or an android application. It works with the point of sale to enable credit card payments for delivery and pick up. It opens the restaurant's market thus allowing orders from outside the physical

restaurant building thus boosting its sales through online connoting.

6. **Basic Reporting Dashboard**

This reporting tool offers info to the managers and Admins concerning the overall performance of the restaurant as per the sales records, trends on certain foods and check the available stock. Daily or weekly or monthly reports are possible, so the decision makers know the general trends to improve the business.

7. **Basic Kiosk System Interface**

This feature facilitates the restaurant by providing a self-serve ordering kiosk in the restaurant to help the customers to order meals on their own. It is designed to work hand in hand with the POS to productively handle orders from the food joints. They add this led to shortening the time clients spend in the restaurants by displaying the menu, ordering, and payment without having to interact with staff.

8. **Data Forecasting**

This particular use employs time series analysis of past sales and consumption patterns to forecast future requirements on inventory. It assists the restaurant to know when it is busiest and allocate resources properly and determine the menu to offer. Using the previous sales records the restaurant can make the right decisions on when to order new stocks, which employees to hire and promotion strategies to use.

2.2 **Users**

- **Admin:** Contains account management, system parameters, and stock administration as well as transaction processing.

- **Manager:** Has duties involving; observing sales reports, planning employee schedules, and controlling inventory.

- **Staff:** Takes orders from customers, change order status and manage payments.

- **Kiosk User:** The effect of using the self-service kiosks in the context of in-store customers placing orders

- **Online Customer:** Customers who never physically visit the store to place orders online through a website or through mobile applications.

- **Delivery Staff:** Responsible for accepting delivery orders and changing the status of delivery.

- **Forecasting Analyst:** Key activities include analyzing the prevailing sales data and stock data to forecast and report on demand.

2.3 Operating Environment

- **POS System:** Operates on internal server systems; Windows or LINUX and interacts with local database systems and networked printers.

- **Kiosk System:** Portable touchscreen machines allied to the POS backend for order fulfillment purposes as well as payments.

- **Online Ordering System:** Web applications based and can be hosted on cloud servers being a Linux/Windows based application and can be opened through web browsers and/or mobile devices.

- **Data Forecasting:** Uses Google Cloud services or local servers for the prediction of Our customer department data using time series forecasting algorithms.

2.4 DESIGN AND IMPLEMENTATION CONSTRAINTS

- **Data Security:** Must keep patient data safe and personal information (PIPA) and follow data protection legislation like GDPR and must maintain a certain level of security of payment data as per PCI DSS.

- **System Scalability:** For this reason, the system has to accommodate more transactions and data as the business expands without a significant decline in its efficiency.

- **Availability:** The system should rely on a very high availability level (99.9%) for both in-store and online work.

- **Hardware Compatibility:** It must integrate with the current hardware including the touchscreen kiosks and payment devices.

2.5 HARDWARE REQUIREMENTS

HARDWARE	MINIMUM SPECIFICATIONS	RECOMMENDED SPECIFICATIONS
LAPTOP AND DEKSTOP	Intel Core i3, 4GB RAM 128GB HHD, Windows 7	Intel Core i5, 8GB RAM 256 SSD, Windows 10 Pro
TOUCHSCREEN MONITOR	Standard 15" Monitor	15" Full HD Touchscreen Monitor
STANDARD MONITOR	17" LED Monitor	19" LED Monitor
THERMAL RECEIPT PRINTER	Any Thermal receipt printer with 100mm/s speed and USB connectivity	Epson TM-T2011, 200mm/s Printing speed, USB and Serial Connectivity.

Table 1: **Hardware Requirements**

2.6 SOFTWARE REQUIREMENTS

SOFTWARE	MINIMUM SPECIFICATIONS	RECOMMENDED SPECIFICATIONS
Operating System	Windows 7, Linux (Ubuntu 16.04), macOS 10.12	Windows 10 Pro or Linux (Ubuntu 20.04 LTS), macOS 10.15

Development Environment	XAMPP (older version) or Node.js (v10.x), MySQL 5.7	XAMPP (latest version) or Node.js(v14x), MySQL 8.0
Database Management	MySQL 5.7	MySQL 8.0, MongoDB (if no SQL required)
Web Technologies	Front-End Vue.js (v2), Back-End: Node.js (v10.x), Express.js(V3)	Front-End: Vue.js (v3) Back-End: Node.js (v14 x), Express.js (v4)
POS Interface Libraries	Data Tables (older version), JQuery UI (v1.10)	Data Tables (latest version), JQuery UI (v1.12)
Browser	Google Chrome (version 75), Firefox (version 60), Edge (version 44).	Google Chrome(latest version), Firefox(latest version), Edge (latest version).

Table 2: **Software Requirements**

2.7 **UPDATED FUNCTIONALITIES REQUIREMENTS**

FEATURES	MINIMUM SPECIFICATION	RECOMMENDED SPECIFICATION
1. **User Registration and Login System**	Enable user registration and role-based access for admin and customers.	Basic form for self-registration, admin-created accounts for admin users, password encryption, and role assignment.
	- Admin accounts created by the system or other admins.	- Customers self-register using a simple form (name, email, password).
	- Encrypted password storage and secure authentication.	- Authentication with basic password encryption.
	- Role-based access (Admin/Customer) and password reset functionality.	- Role-based access and password reset feature.
2. **Order Management (POS System Core)**	Comprehensive in-store order management with calculation and receipt printing.	Basic item selection, quantity input, and order storage with unique IDs.
	- Menu for item selection, tax calculation, and order finalization.	- Basic functionality to select items, calculate totals, and mark order status.
	- Order status tracking (pending, paid, canceled).	- Store orders in the database with status updates.
	- Receipt printing capability.	- Optional receipt output.
3. **Inventory Management**	Accurate stock tracking with low-stock alerts and admin update capability.	Basic stock deduction when orders are placed and admin manual update.
	- Deduct inventory when orders are fulfilled.	- Simple stock deduction feature.
	- Low-stock alerts via email or	- Manually monitor inventory status.

	system notification.	
	- Admin ability to update stock levels for shipments.	- Allow manual stock updates by admin.
4. **Payment Processing**	Cash and placeholder for e-wallet integration (GCash or PayPal).	Cash payment recording and basic "Paid" status update.
	- Options for cash payments and placeholder buttons for future e-wallet API integration.	- Record cash payments and mark orders as paid.
	- Update database to reflect payment status.	- Manual payment status updates.
5. **Kiosk System**	Touchscreen-friendly interface for ordering and synchronization with POS system.	Basic touchscreen interface for item selection and order review.
	- Large buttons for item selection and order customization.	- Simple interface for item selection and order finalization.
	- Display order summary for modification before finalization.	- Basic order summary display.
6. **Online Ordering**	Responsive web/mobile platform for browsing, selecting, and ordering items online.	Basic web interface for online orders with simple admin monitoring.
	- Admin panel to manage menu and monitor orders.	- Simple order monitoring interface for admins.
7. **Sales Reporting**	Generate and export sales insights in CSV/PDF formats with top-selling item insights.	Basic sales report generation for selected periods.
	- Aggregate sales data for selected periods (daily, weekly, monthly).	- Manual sales data aggregation.
	- Highlight top-selling items and total sales.	- Show total sales figures only.
	- Export reports in CSV/PDF formats.	- Optional export functionality.
8. **Data Forecasting Using Time Series**	Leverage sales data for accurate demand prediction and inventory planning.	Collect and display past sales data for manual trend analysis.
	- Use historical sales data for predictive forecasting.	- Use simple historical sales data visualization.

Table 3: **Updated Functionalities Requirements**

2.8 NON-FUNCTIONAL REQUIREMENTS

Requirement	Minimum Specifications	Recommended Specifications
Usability	Basic UI with easy navigation	UI designed for ease of use with accessibility features (voice commands, screen reader)
Training and Support	Basic training material, limited support during business hour	In-depth training sessions, comprehensive manuals, 24/7 customer support
Response Time	Order processing with 5 seconds, report generation within 5 seconds	Real-time order processing (within 2 seconds) less than 1 second for report generation
Scalability	Supports up to 200 concurrent users	Supports up to 1,000 concurrent users with no performance degradation
Uptime Guarantee	95% availability with manual intervention required	99.9% availability with automated failover and loading balance
Data Integrity	Weekly backups, local storage, RTO of less than 24 hours	Real-time backups, secure off-site storage, recovery time objective (RTO) of less than 1 hour
Data Protection	Basic encryption (AES-128), role-based access control	End-to-end encryption (AES-256), role-based access control, compliance with GDPR, PCI DSS
Cultural Requirements	English language support	Multilingual support (English, Filipino), user interface customization based on regional preferences

Table 4: **Non-Functionalities Requirements**

CHAPTER III
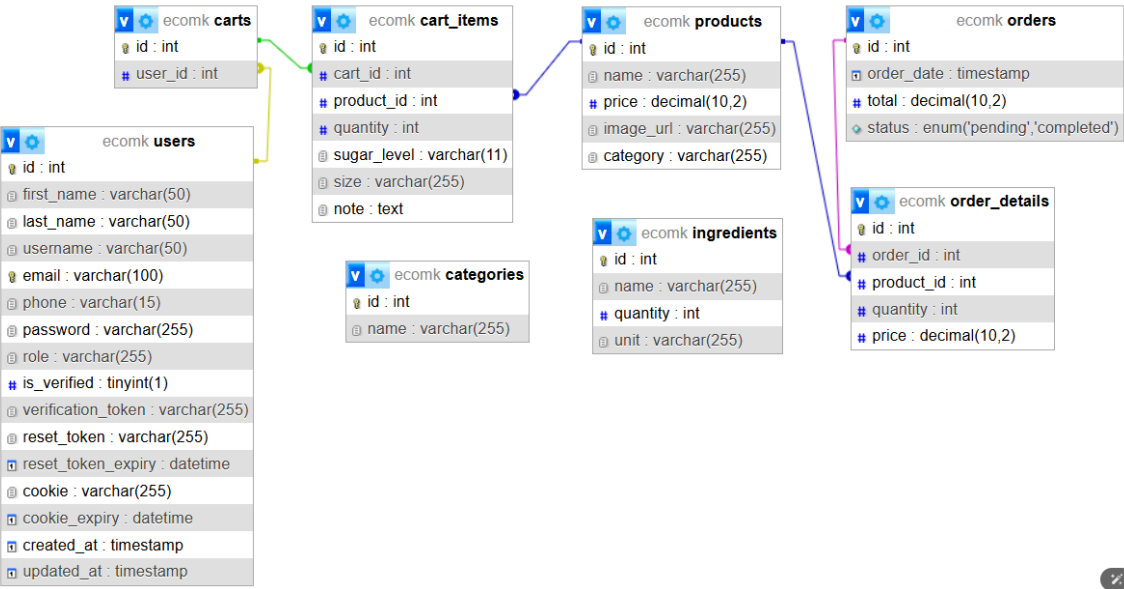
DESIGN AND DEVELOPMENT METHODOLOGIES

SYSTEM DESIGN

DATABASE DESIGN

IMAGE 1: DATABASE SCHEMA

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
1	id 🔑	int			No	None		AUTO_INCREMENT
2	cart_id 🔑	int			No	None		
3	product_id 🔑	int			No	None		
4	quantity	int			No	None		
5	sugar_level	varchar(11)	utf8mb4_general_ci		No	100		
6	size	varchar(255)	utf8mb4_general_ci		No	small		
7	note	text	utf8mb4_general_ci		No	None		

IMAGE 2: CARTS ITEM TABLE DATABASE

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
1	id 🔑	int			No	None		AUTO_INCREMENT
2	name	varchar(255)	utf8mb4_general_ci		No	None		

IMAGE 3: CATEGORIES TABLE DATABASE

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
1	id 🔑	int			No	None		AUTO_INCREMENT
2	name	varchar(255)	utf8mb4_general_ci		No	None		
3	quantity	int			No	None		
4	unit	varchar(255)	utf8mb4_general_ci		No	None		

IMAGE 4: INGREDIENTS TABLE DATABASE

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
1	id 🔑	int			No	None		AUTO_INCREMENT
2	order_id 🔑	int			Yes	NULL		
3	product_id 🔑	int			Yes	NULL		
4	quantity	int			Yes	NULL		
5	price	decimal(10,2)			Yes	NULL		

IMAGE 5: ORDERS DETAILS TABLE DATABASE

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
1	id	int			No	None		AUTO_INCREMENT
2	order_date	timestamp			No	CURRENT_TIMESTAMP		DEFAULT_GENERATED
3	total	decimal(10,2)			Yes	NULL		
4	status	enum('pending', 'completed')	utf8mb4_general_ci		Yes	pending		

IMAGE 6: ORDERS TABLE DATABASE

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
1	id	int			No	None		AUTO_INCREMENT
2	name	varchar(255)	utf8mb4_general_ci		No	None		
3	price	decimal(10,2)			No	None		
4	image_url	varchar(255)	utf8mb4_general_ci		No	None		
5	category	varchar(255)	utf8mb4_general_ci		No	None		

IMAGE 7: PRODUCTS TABLE DATABASE

Table structure | Relation view

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
1	id	int			No	None		AUTO_INCREMENT
2	user_id	int			No	None		

IMAGE 8: TABLE CARTS TABLE DATABASE

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
1	id	int			No	None		AUTO_INCREMENT
2	first_name	varchar(50)	utf8mb4_general_ci		No	None		
3	last_name	varchar(50)	utf8mb4_general_ci		No	None		
4	username	varchar(50)	utf8mb4_general_ci		No	None		
5	email	varchar(100)	utf8mb4_general_ci		No	None		
6	phone	varchar(15)	utf8mb4_general_ci		No	None		
7	password	varchar(255)	utf8mb4_general_ci		No	None		
8	role	varchar(255)	utf8mb4_general_ci		No	user		
9	is_verified	tinyint(1)			Yes	0		
10	verification_token	varchar(255)	utf8mb4_general_ci		Yes	NULL		
11	reset_token	varchar(255)	utf8mb4_general_ci		Yes	NULL		
12	reset_token_expiry	datetime			Yes	NULL		
13	cookie	varchar(255)	utf8mb4_general_ci		Yes	NULL		
14	cookie_expiry	datetime			Yes	NULL		
15	created_at	timestamp			No	CURRENT_TIMESTAMP		DEFAULT_GENERATED
16	updated_at	timestamp		on update CURRENT_TIMESTAMP	No	CURRENT_TIMESTAMP		DEFAULT_GENERATED ON UPDATE CURRENT_TIMESTAMP

IMAGE 9: USERS TABLE DATABASE
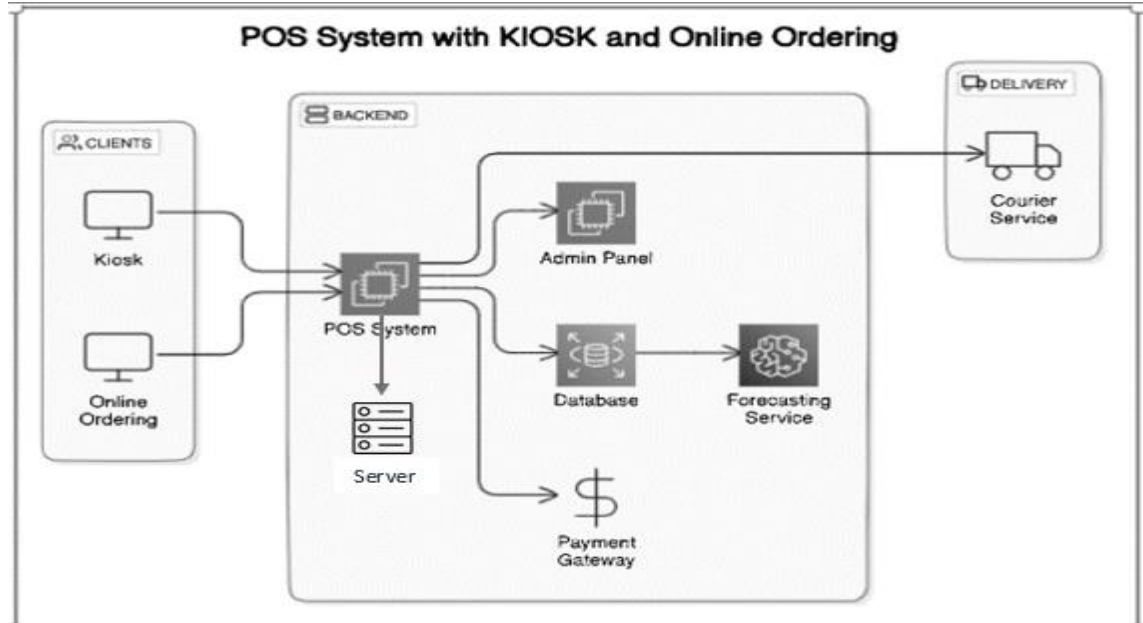
SYSTEM ARCHITECTURAL DIAGRAM

FIGURE 1: SYSTEM ARCHITECTURAL DIAGRAM

Figure 1 explained Designed to improve business operations, customer satisfaction, and efficiency, the Lebrew Foodhouse: POS System with KIOSK and Online Ordering with Data Forecasting Using Time Series Forecasting is a complete solution. It offers convenience and cuts down on waiting times by integrating a self-service kiosk for in-store patrons with an internet ordering platform for users who are located far away. The backend of the system consists of a centralized point-of-sale system that stores sales, customers, and stock data and processes and integrates transactions across platforms. Through an admin interface, which makes inventory management, sales monitoring, and kiosk or platform setting easier, administrators can keep an eye on operations. A time series analysis-powered forecasting service uses previous data to anticipate future patterns, improving inventory management and cutting down on waste. For smooth transaction processing, the system also has a secure payment gateway. To guarantee effective order fulfillment and tracking, it interfaces with a courier service for delivery. Combining these elements makes the system a contemporary and useful tool for Lebrew Foodhouse's expansion by facilitating order administration, improving customer happiness, and facilitating data-driven decision-making.
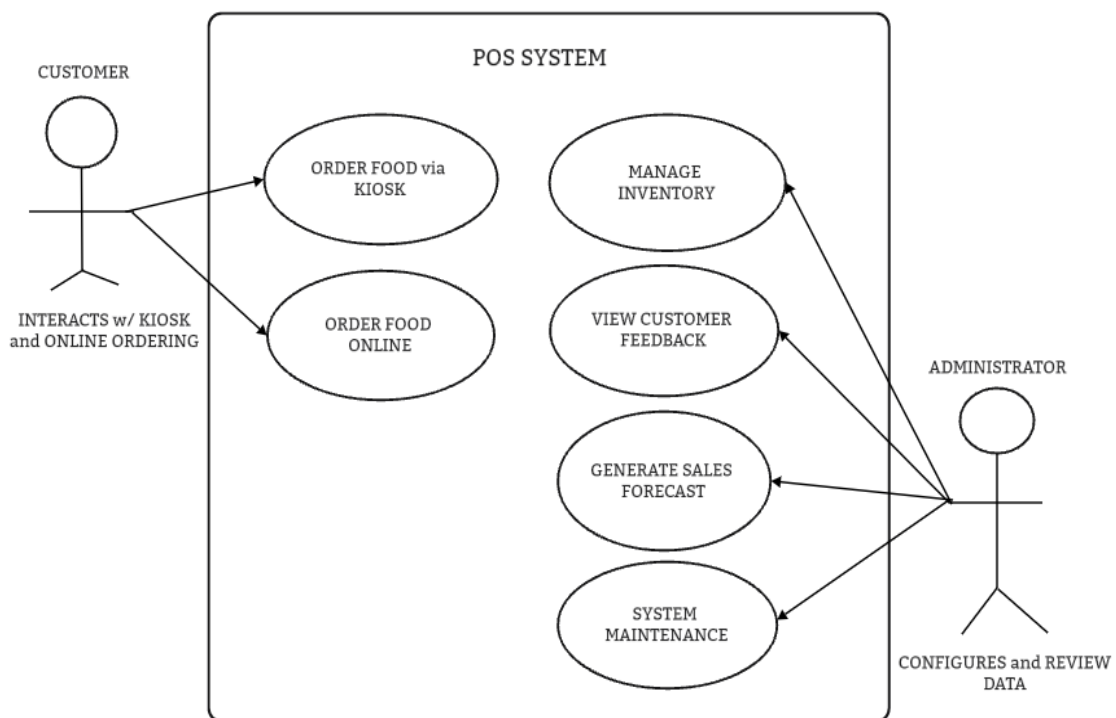
UML USE-CASE DIAGRAM

FIGURE 2: UML USE-CASE DIAGRAM

Figure 2 explained this Use Case diagram of UML depicts the functional requirements of Lebrew Foodhouse's POS System that has features of Self-service KIOSK, online ordering, and Time series analysis for data prediction. To place an order, the Customer uses the main channel of human-system communication, which can be the in-store KIOSK or an online order form. The Administrator monitors the system with tools

such as sales analysis that enables it estimate demand, stock control that enables it to ensure adequate stock, and consumer feedback meant for service delivery enhancement. Also, we maintain the system and drive decisions based on data that will lead to improved system performance and customer satisfaction.
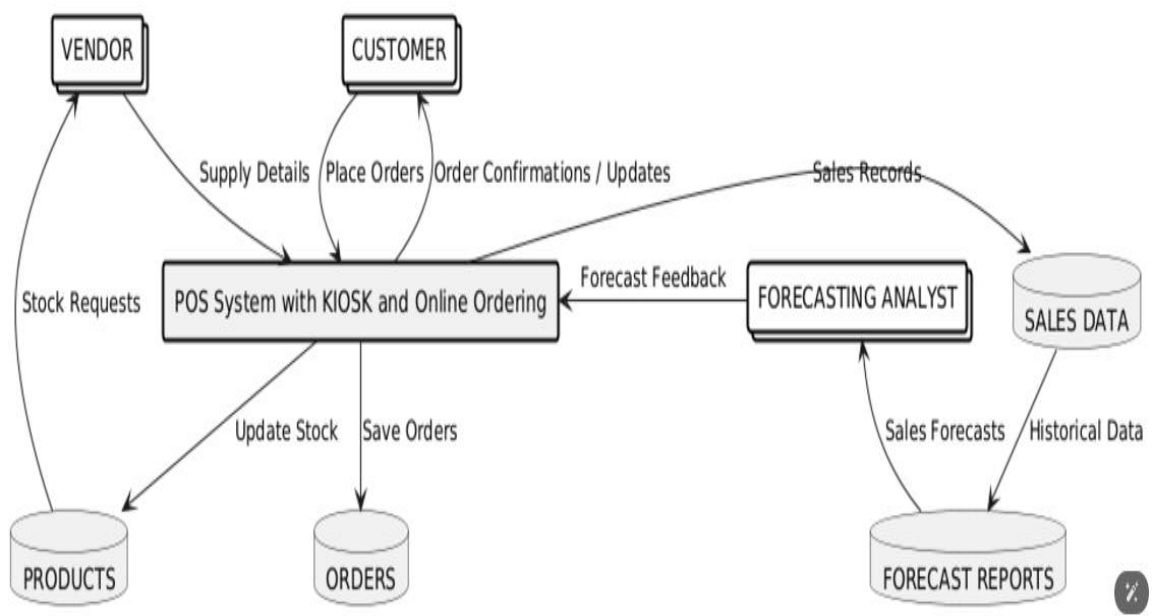
DFD Level 0

FIGURE 3: DFD Level 0

Figure 3 explained this is a Data Flow Diagram (DFD) Level 0, which shows the relationships between the major actors and the POS System with KIOSK and Online Ordering in Lebrew Foodhouse. The customers order through the POS and are notified of acceptance or changes through the same and the POS has records and updates orders and stock. Regarding stocks Vendors deliver stocks according to the requests that have occurred through the system, and make sure there is enough product. To produce forecast reports about the flow of sales, the Forecasting Analyst employs time series analysis with data from the past as the basis. Such reports spearhead the stock adjustments and supplies to cater the need for consumption efficient functioning and demand management.

SAMPLE MOCK-UP
DEKSTOP PROTOTYPE DESIGN
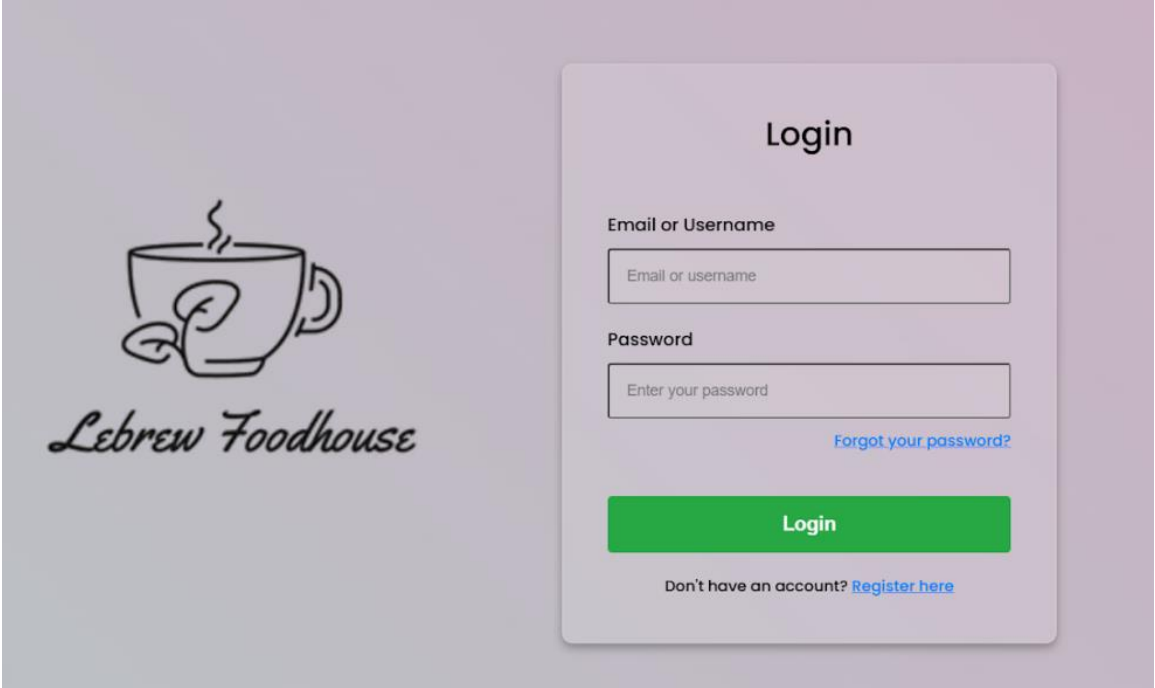
IMAGE 10: HOME PAGE DEKSTOP VIEW

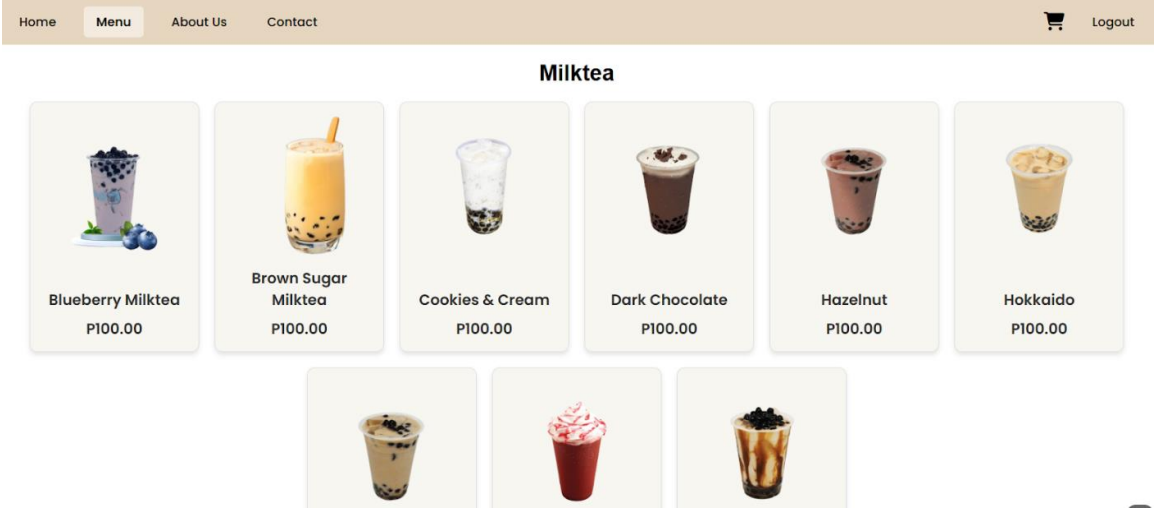**IMAGE 11:** LOG IN DEKSTOP VIEW

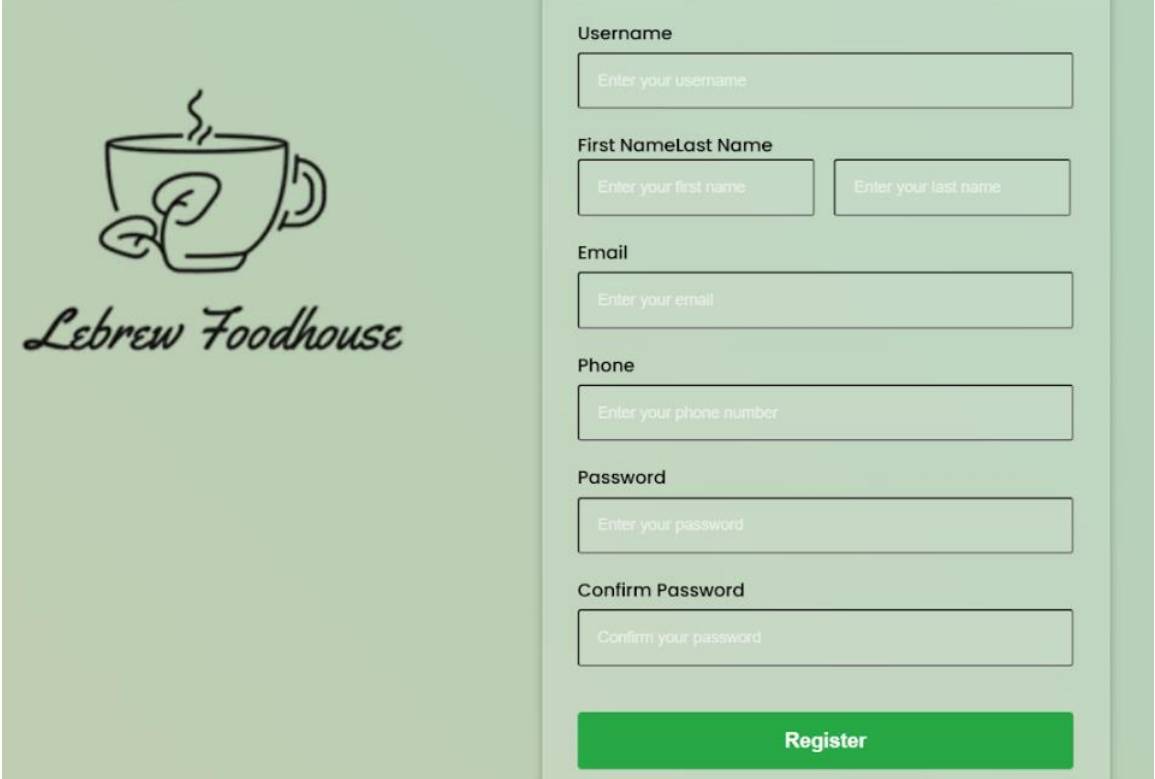**IMAGE 11:** MENU PAGE DEKSTOP VIEW

IMAGE 12: REGISTER DEKSTOP VIEW

MOBILE PROTOTYPE DESIGN
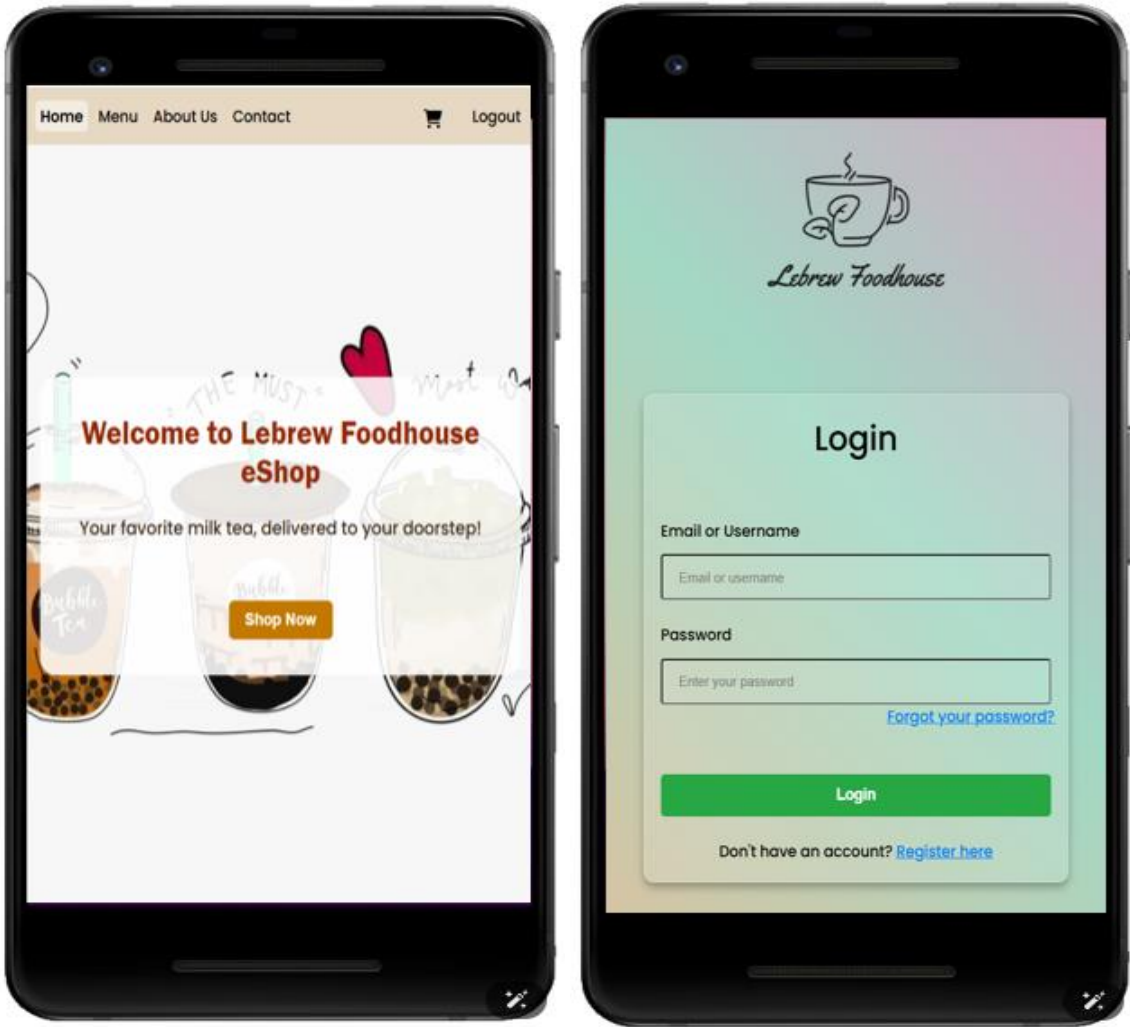

IMAGE 13: HOME PAGE (LEFT) AND LOG IN (RIGHT) MOBILE VIEW
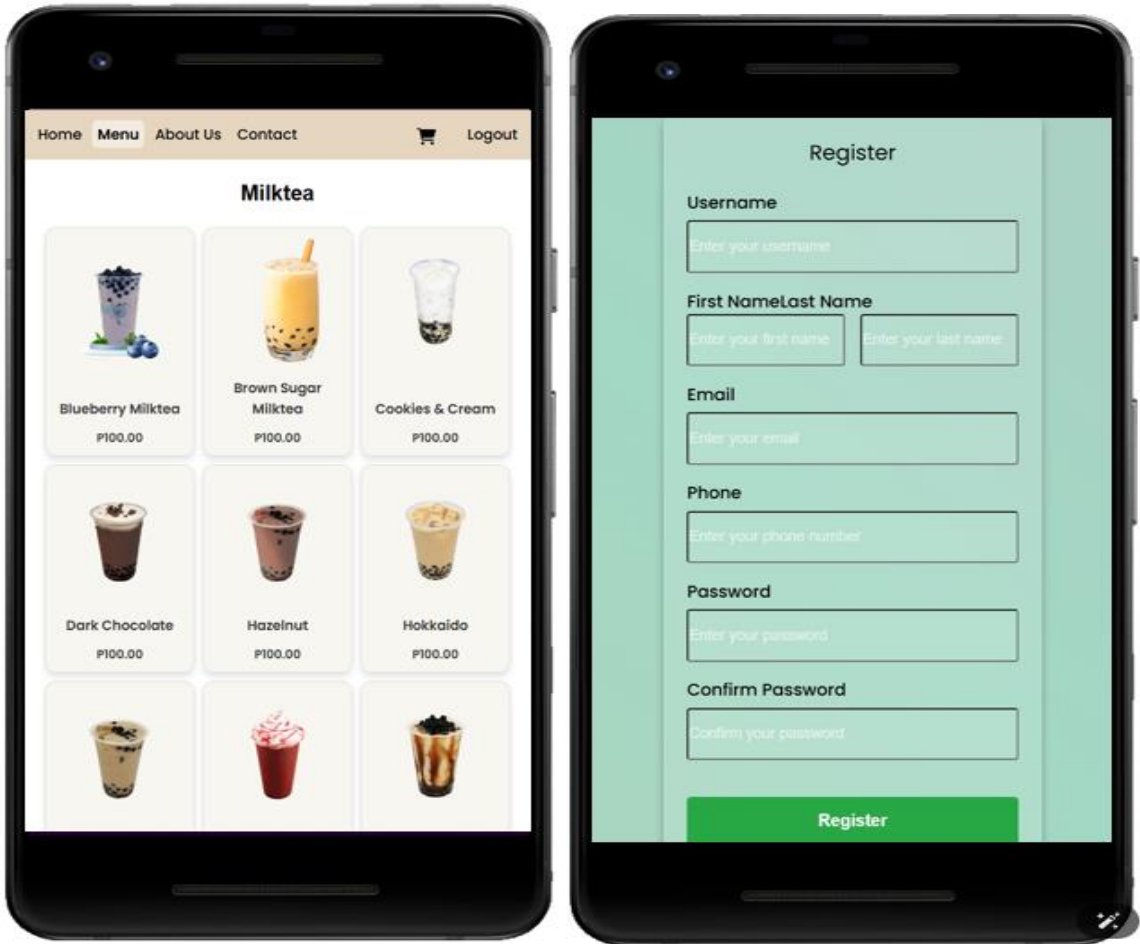

IMAGE 14: MENU PAGE (LEFT) AND REGISTER (RIGHT) MOBILE VIEW

METHODOLOGY

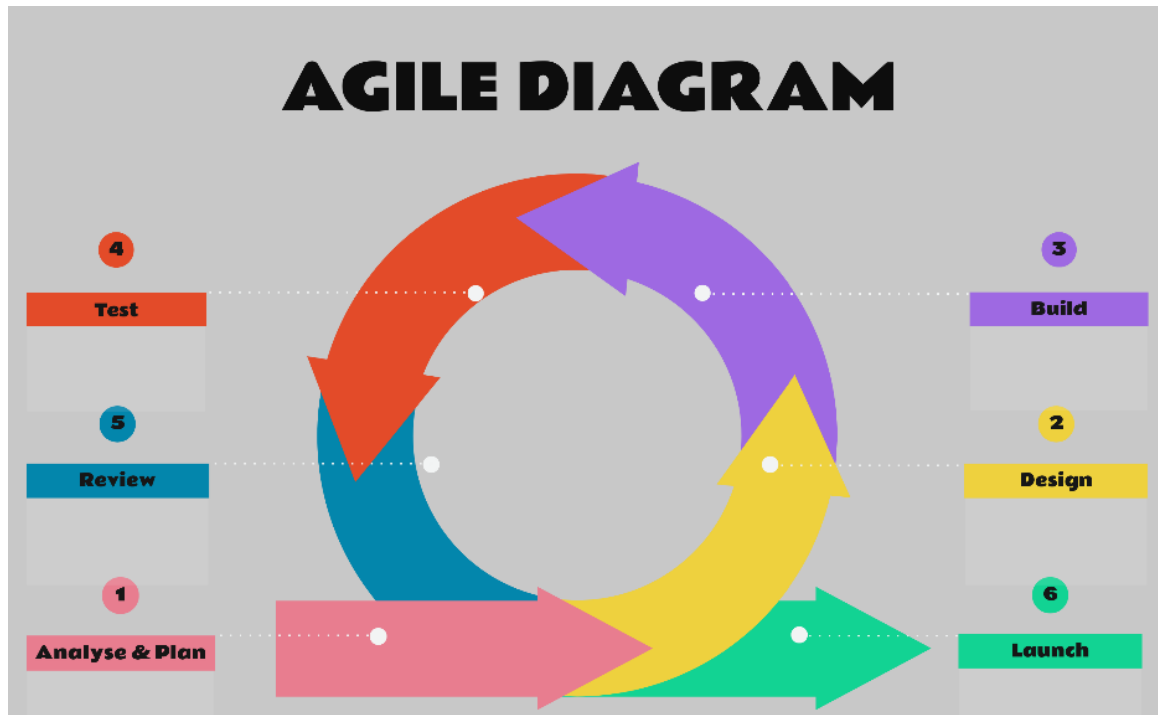**Agile Methodology for Lebrew Foodhouse POS System**

Figure 4: AGILE METHODOLOGY DIAGRAM

Figure 4 explained the Agile Diagram presents a system that is in a life cycle form; this approach can be justified for the development of the Lebrew Foodhouse POS System with KIOSK and Online Ordering since it has iterative and user-centered goals. The six phases (Analyze & Plan, Design, Build, Test, Review, and Launch) are in line with how the features of the system are imagined, created and improved. Here's how each stage connects to the system's functionalities:

1) **Analyze & Plan**: The basis of the project is rooted in understanding of needs; for example, user registration, roles and permissions, as well as database structure for orders and stock. For instance, this stage employs authentication to guarantee that many admin and customer roles are implemented safely with encrypted passwords; in addition, proper initial objectives such as time-series forecasting need to be clarified.

2) **Design**: Navigating the Point-of-Sale system, the KIOSK and the online ordering solution requires simplicity thus developing user interfaces and easy to follow workflows. Here we get a road map correlating things like a responsive web/mobile platform, KIOSK interface developed to be touchscreen friendly and simple, intuitive, clean sales reporting. This stage includes such key concepts as ease of use and others that are related to the combination of offline/online shopping experiences.

3) **Build**: Cohesive components which are some of the basic ones that include order fulfilment, payments and inventory are created. Per phase, the system encompasses receipt printing, low-stock notification, and manual admin interfaces regarding inventory during the

construction of placeholders for sophisticated e-Wallet integrations (GCash or PayPal).

4) **Test:** Testing makes it certain that the system features perform as intended to. The current order situation, the number of payments, the availability of cancellations, and data sales and analysis as well as demand prediction based on business history are checked to confirm that their function works. The interactions and responsiveness of both the KIOSK and the online ordering interface with the POS system are checked.

5) **Review:** As a thumb rule, feedback is taken from the system after testing and then used to improve the system. For example, optimizing stock deduction procedures, or increasing the reliability of time series demand forecasts contributes to the resiliency of the system. Input from the users regarding ease of use during the customer registration or order summary display is also collected in this section.

6) **Launch:** Finally, some improvements and modifications are made and then the system is implemented. Every capability, whether managing the menu, recording sales, or providing up to the minute tracking of inventory, is provided. The option of exporting of sales info in CSV/PDF format plus identification of bestselling products facilitate business decisions after launch.

TESTING

TYPE OF TESTING	ACTIVITY	PURPOSE
Requirement Analysis Testing	Checked on all the functional requirements with relation to the business as well as user demands.	To ensure that all the features developed (Registration feature, Order feature, Inventory feature) correspond to the outlined objectives and correspond fully to the functional requirements of Lebrew Foodhouse.
Unit Testing	Specific subsystems were checked comprehensively, but only a few isolated ones, for example, user registration forms, subtraction of the inventory stock, or the payment status.	To ensure that each module meets its required responsibility and how input and output signals are treated in each module before the combining of these modules.
Integration Testing	Engaged the multiple modules in elaborate tests like the KIOSK placing orders that are synchronized with	In order to maximize cooperation between coupled interfaces and eliminate

	the POS or online orders placed that update the stock.	integration-related errors.
Functional Testing	Verified, for example, login/logout, order placement and sales report generation with the minimum and recommended requirements.	For certifying different features work as expected and meet customers' requirements in normal working environment.
Usability Testing	Conducted usability testing of KIOSK system, Online ordering system and administrator interface to identify ease of navigation, ease of use and interactivity.	To minimize the training time of the customers and the admin and to avoid much error while operating it.
Security Testing	Examined the effectiveness of the password encryption, authentication mechanisms that had been followed to protect against intruders or hackers.	For protecting user information from unauthorized access and manipulation mainly in restricted domains as login information and payments functions.
Performance Testing	Observed how such metrics, as system inputs/outputs during load conditions, order processing, or sales reports compilation, work.	To ensure that the functions of the system are effective during maximum loads to avoid disappointments as workers perform their tasks.
Database Testing	Verified functionality of the storage for orders, inventories, and sales report for its efficiency and effective.	To avoid data corruption on stored data, check that update where properly made, and check on reports to make certain they are up to date.
Error handling and Validation testing	Performed form inputs (user registration) and checked if the forms and transactions have the correct Error and Validation handling.	To prevent fallout when the system fails to handle certain errors or problems while performing mechanisms of serving a specific user.
System Testing	Assumed full responsibility for the overall comprehensive testing of the entire system, focusing on potential open issues like customer order,	To prove that the system functional and integrated as a complete system and meets functional and non-functional needs.

	admin changes, and finally sales reports.	
Regression Testing	Researched previously tested functionalities whenever there were modifications on the program, for example, on payment processing or the layout.	To guarantee that new updates are not characterized by errors or removal of some useful accessor functions.
Acceptance Testing	Compared the developed system with its requirements to ascertain the feasibility of the system and prepared for implementation.	To ensure that after implementation the delivered system meets the requirements and expectations of users in real process environments.

Table 5: **Testing Evaluation**

ISO 25010 Evaluation

ISO EIGHT KEY QUALITY CHARACTERISTICS	QUESTION:
Functional Suitability	Do the recommended or chosen system components satisfy a set of requirements?
Performance Efficiency	Is it effective under some specific circumstances or situation at hand?
Compatibility	Can it work in partnership with other systems?
Usability	Is it easy to use and learn?
Reliability	How does it work without failure?
Maintainability	How scalable and adaptable is it?
Portability	Will it be able to operate?

Table 6: **ISO 25010 Evaluation**

Respondents Profile
Likert Scale
Evaluation Instrument

CHAPTER IV
DEVELOPMENT, TESTING AND EVALUATION RESULT
Presentation of the System Output

Testing Results

ISO 25010 Evaluation Result

CHAPTER V

CONCLUSION AND RECOMMENDATION

Conclusion

Recommendation

REFERENCES