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MushMagic: Mushroom Ordering Application

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Abstract

This article discusses the Mushroom Ordering Application, which aims to provide farmers and mushroom customers with a dependable and easy-to-use platform for purchasing mushrooms and associated items. This study's primary goals are to build the programme using Android technology, design it according to object-oriented concepts, and extensively test the system. The Agile technique, which includes important phases including requirement analysis, design, development, quality assurance, and deployment, was used to create the application. The programme was developed using object-oriented software development approaches to provide scalability and organisation. Google Firebase was selected as the database, while Android Studio was used for development. The programme has a simple ordering process, strong quality control procedures, and an intuitive user interface. The results show that the application may create a network of mushroom producers and improve mushroom accessibility for both novice and experienced customers. The research highlights how important this technical development is to enhancing the commerce and production of mushrooms. Based on user input and shifting market demands, the suggestions advise constant enhancements to the programme to satisfy changing industry standards and user expectations.

1. Introduction

The main goal of this project is to create and launch a new online ordering application "MushMagic" to simplify the process of buying mushrooms. Offering an easy-to-use app, customers can quickly explore a variety of mushrooms, view detailed product information, place orders, and track purchases. Currently, AGS PRO Enterprise based in Kampung Pengkalan Lebai Man, Kedah uses the traditional method of ordering mushrooms. Customers participate in the ordering process through in-person contact with personnel on-site. To place an order, a customer must manually enter the information, usually using paper forms or papers. Information about inventory and customers is kept on paper. The recommended remedy suggests a cutting-edge addition to the mushroom ordering process that will update the way clients interact with AGS PRO Enterprise.

By adopting a manual approach, companies find it difficult to serve a wider base of customers who are increasingly used to the convenience of doing business online. This manual approach leads to accidental data manipulation and increases the chances of data loss. Data loss can compromise order fulfillment and customer service, negatively impacting growth, customer satisfaction, and overall market competitiveness. The proposed mushroom procurement application aims to change the current setup by providing a solution that overcomes the limitations of manual procedures.

The MushMagic application aims to develop and implement a mushroom ordering application using object-oriented Android technology. Key users include the administrator, employees, and customers. The system incorporates essential modules like user management module, order management module, product

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management, financial management, data analytics, and reporting module to enhance operational efficiency and customer satisfaction. The primary goal is to create an effective system that allows seamless interaction with the menu, enabling order placement, customization of items, and special requests. Post-implementation, the system is expected to improve farm operations, reduce wait times, and offer real-time data analytics for informed decision-making. Its scalability ensures adaptability in an ever-changing business environment, facilitating future expansion. The significance lies in revolutionizing AGS Pro's business operations with faster order processing, efficient waitlist management, and real-time data analytics, establishing it as a technologically advanced and customer-centric restaurant for the long term.

To tackle the research issue methodically, the paper has numerous sections. Section 2 includes a complete literature analysis of relevant earlier research and current implementations. In Section 3, the system development technique is detailed, providing useful insights into system analysis and design. Section 4 then analyzes and discusses the system outcomes, providing valuable insights. Section 5 concludes with a summary of the paper's main findings and research proposals. This methodological structure ensures a logical and observant analysis of the topic, including a literature review, practical application, and insightful recommendations for future research.

2. Related Work

This section provides an overview of the mushroom ordering application, technology used, and application system, and conducts a comparative analysis of the proposed system and the existing system.

2.1 Mushroom Ordering System

The rise of appealing, easy-to-use applications and technologically advanced transportation networks, along with evolving customer demands, has made delivery a significant market. Early in the pandemic, lockdowns and physical separation regulations greatly boosted the sector, with delivery turning becoming a lifeline for the struggling farm business[1]. Even online platform may not offer a face-to-face interaction between the buyer and the vendor, it does offer comprehensive information about the parties involved and the methods used in the production or growing of the items. After filling their "cart" during their opportunity to purchase on the platform or phone app the consumer receives a weekly delivery in an insulated package along with text messages indicating when it will come. An application for ordering and delivery of mushrooms is a digital platform that makes the process of buying mushrooms easier by giving consumers a quick and easy method to browse, purchase, and get the goods they want made from mushrooms. Usually, this application serves customers as well as businesses who grow and sell mushrooms.

2.2 Mobile application (App)

An application designed with a specific end user in mind is called an application. It is designed to provide a service to an end user by performing a specific task or task. It can be used on various platforms such as tablets, smartphones, desktop computers, and other electronic devices[2]. This changing environment now presents both great opportunities and limitations for mobile app developers. Therefore, developers need to evaluate their options and decide how to take advantage of this new trend. Current trends include different types of applications including desktop, online, and mobile applications. As a result, AGS Pro Enterprise and the company chose this proposed system to provide a mushroom ordering platform and a mobile application that can be easily accessed from any Android phone to improve the company's customer experience.

As delve deeper into the nuances of the mobile application, it becomes evident that it serves as more than a digital storefront. An innovative tool that balances technology, user experience and operational efficiency. In the ever-evolving landscape of mobile applications, the System for AGS Pro Enterprise emerges not only as a response to today's consumer preferences, but also as a strategic testament to the symbiotic relationship between technological innovation and customer-centric solutions. With this app, AGS Pro Enterprise not only meets the needs of modern customers, but also lays the foundation for an improved and simplified mushroom ordering experience.

2.3 Study of Existing Related Systems

In this section, three extant systems that are comparable to the system being constructed will be analysed. An analysis is conducted on the characteristics and operations of the current systems, followed by a comparison with the mushroom ordering application that was developed. Three comparable pre-existing systems that have been selected are Shopee [3], FoodPanda [4], and MYGrocer [5]. Table 1 shows the comparison between existing system and the developed system.

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Table 1 *Comparison between Existing Systems and Developed Systems*

System / Features	FoodPanda[4]	MyGrocer[5]	Shopee[3]	MushMagic(Mushroom Ordering Application)
User management Module	√	√	√	√
Process Order	√	√	√	√
Order Management Module	√	√	√	√
Product management module	√	√	√	√
Financial management module	√	√	√	√
Data analysis and reporting module	√	x	√	√
System type	App and Web-Based	Web-based	App and Web-based	App

3. Methodology

This section provides a summary of the methodology, analysis, and design stages involved in the development of a system. A comprehensive analysis and discussion of both the functional and non-functional requirements of the full designed system are provided. This part displays the outcomes of system analysis, including technical diagrams such as use case diagrams and class diagrams of the proposed system. Draw.io, an online tool, was used for creating these technical diagrams. Furthermore, the wireframe of the system is also shown in this section.

3.1 Agile Model

The goal of this project is to create MushMagic, an application for AGS PRO Enterprise that allows users to purchase mushrooms quickly and easily. Because of its user-centric and iterative approach, which involves ongoing user participation throughout the project lifetime, the Agile methodology was chosen. The development process had numerous crucial stages, including planning, requirement analysis, design, implementation, testing, and deployment. It ran from August 10, 2023, to June 27, 2024. The project included developing an intuitive mobile ordering application for mushrooms, aimed for AGS PRO Enterprise administrators, staff, and clients. In order to guarantee precise inventory management, effective order monitoring, and safe financial transactions, the programme was created to streamline and improve the ordering process. Stakeholders, including Juwes Raj and the AGS PRO Enterprise team, oversaw the development process, and the finished product was meant to be included into AGS PRO Enterprise's operations. The development team made sure that user needs were carefully examined and taken care of in coordination with AGS PRO Enterprise stakeholders. Six steps of an iterative development process were made possible by the Agile approach. Information was gathered via interviews during the requirement phase, and hardware and software analysis took place during the analysis phase. The coding phase concentrated on putting the system in place using the wireframes and database design that were created during the design phase. Testing included security, functional, and interface evaluations, as well as user input for enhancements. Ultimately, the system was delivered and set up for deployment, with continuous maintenance to guarantee system performance and quality.

Table 2 *System development activities and tasks*

Phase	Task	Output
Requirement Phase	• Collect information through interviews • Develop a Gantt Chart for project scheduling	• Project proposal • Gantt chart • Interview
Analysis Phase	• Analysis of hardware and software requirements • Analyse user requirements	• User requirements • Hardware and software requirements • Sequence diagram, activity diagram, case diagram
Design Phase	• Design wireframes of the system's user interface. • Design database	• Object-oriented approach selected • Wireframe of the system's flow
Coding Phase	• Code the system based on requirements • Develop interface and connect databases • Implement error detection and correction	• System code based on designs • Functional interface connected to the database
Testing Phase	• Test the system for defects and requirements compliance • Perform interface, functional, and security testing • Address and resolve identified defects Conduct user training and system orientation • Address user feedback and implement improvements	• System testing results and defect reports • Test outcomes and security assessment • Defect resolution and quality assurance • Users trained to operate the system • Constructive user feedback • System error reporting and resolution
Deployment Phase	• Deploy the system to customer environments • Ensure system functionality in production	• Installed system for customer use • System live and operational

3.2 System Requirement

Researching, identifying, and recording user expectations and requirements for a software solution to solve a problem is called requirements analysis [6]. It requires understanding and describing system functionality and performance needs from users, customers, and developers' viewpoints. System requirements include user, software, hardware, and functional and non-functional requirements. These specifications are particular to the system, its users, and the organization's requirement-writing style.

Table 3 lists MushMagic: mushroom ordering application functional requirements. Non-functional requirements define system behaviour, not functions. Both forms of criteria are crucial for application comprehension and development. Table 4 Non-functional requirements of the proposed system.

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Table 3 *Functional requirements of the developed system*

No	Module	Description
1	User Management Module	• Administrators can create, update and manage user accounts by specifying password policy criteria. • Administrators can assign roles and permissions (e.g., administrator, employee) based on user responsibilities. • Provides robust user account management, including account recovery mechanisms.
2	Order Management Module	• Allow customers can search for products, view detailed product information, place orders, and track order history. • Enable the employee to initiate the order, order it, and demonstrate the workflow steps. • Detailed updates at each stage of order fulfilment allow customers to track order status in real-time. • Provides extensive order history for both customers and employees to view and discuss. • Allow customers can search for products, view detailed product information, place orders, and track order history. • Enable the employee to initiate the order, order it, and demonstrate the workflow steps. • Detailed updates at each stage of order fulfilment allow customers to track order status in real-time. • Provides extensive order history for both customers and employees to view and discuss.
3	Product Management Module	• Allow the administrators full access to product management, including adding, editing, and deleting product listings. • Shows how to update product information and synchronize system changes. • Implement an easy-to-use interface where customers can search for product reviews, view detailed product information
4	Financial Management Module	• Allow customers for their orders using a variety of payment methods. • Allows administrator to track financial transactions, track payments and manage financial irregularities or issues. • Implementation of a secure payment gateway for transaction processing.
5	Data Analysis and Reporting Module	• Enable the Administrators can create and retrieve reports to learn about sales trends, consumer behaviour, and product popularity. • Display types of reports such as monthly sales reports, popular products reports, customer behavior analysis, etc.

Table 4 *Non-functional requirements of the developed system*

No	Module	Description
1	Performance	• The application should be available for use almost all the time, with a target uptime percentage of 99.9%. • The interaction between the user and the application, from any device, should not exceed 1 minute for standard operations.
2	Operational	• The system should be available for use 24/7, with planned maintenance communicated in advance to users. • The application should provide a user-friendly interface with intuitive navigation and responsiveness. • The system should be compatible only with the Android operating system, ensuring optimized performance and consistent user experience.
3	Security	• Access to the application should be restricted to authorized administrators, employees, and customers. • User credentials should be stored securely using industry-standard encryption techniques, implementing robust measures against unauthorized access. • The application should feature role-based access control to manage permissions effectively.
4	Cultural and Political	• The application should support transactions in Malaysian Ringgit (MYR) and display financial information in the local currency. • Adhere to relevant cultural and political considerations, ensuring the application aligns with local regulations and business practices.

3.3 System Analysis

System analysis is the full development and flow of systems needed to determine their functionality. This section will describe the proposed system's design and analysis. The suggested system uses an object-oriented approach, developing system analysis throughout analysis and design and converting it into Use Case Diagrams, Sequence Diagrams, Class Diagrams, and Activity Diagrams. Software analysis and design need use case diagrams to visualize user (actor)-system interaction. The figure shows the system's main functionality by capturing use cases, actors, and relationships. An effective and systematic strategy is essential for e-commerce success. The Mushroom e-commerce platform serves customers, administrators, and staff. The mushroom ordering application's use case diagram is shown in Appendix A. This class diagram focuses on this application's entities, relationships, and compositions and reveals its design and architecture in Appendix B. The appendices C and D show the flowcharts for customers and administrators. The flowchart shows the flow of the system from start to end.

3.4 System Design

Once a comprehensive analysis of all user requirements has been completed, the project will enter its design phase. Both the interface and database were developed during this stage to facilitate the visualization of the system prior to its implementation. The system architecture design in Figure 1 involves customer registration and login processes, with user data stored in the database. Customers can edit profiles, view products, place orders, and manage their shopping carts, with all information retrieved from the database. Administrators, after authentication, have the capability to manage products, approve user orders, and access sales performance data for each customer, all of which is stored and retrieved from the database.

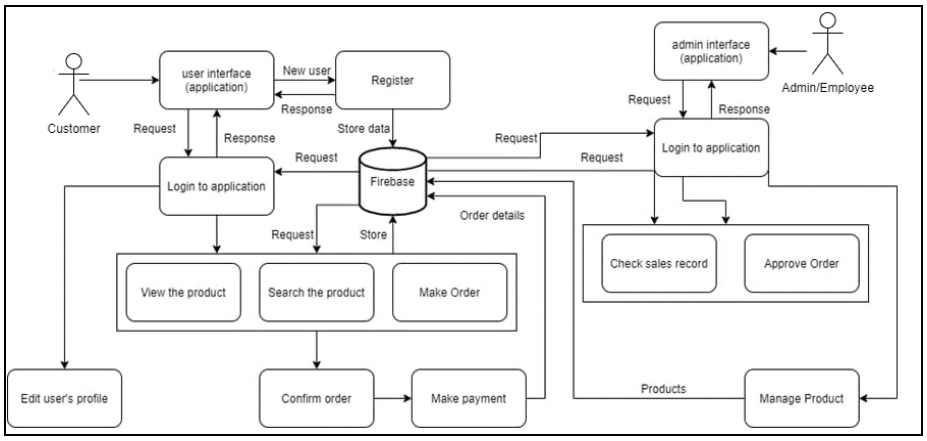
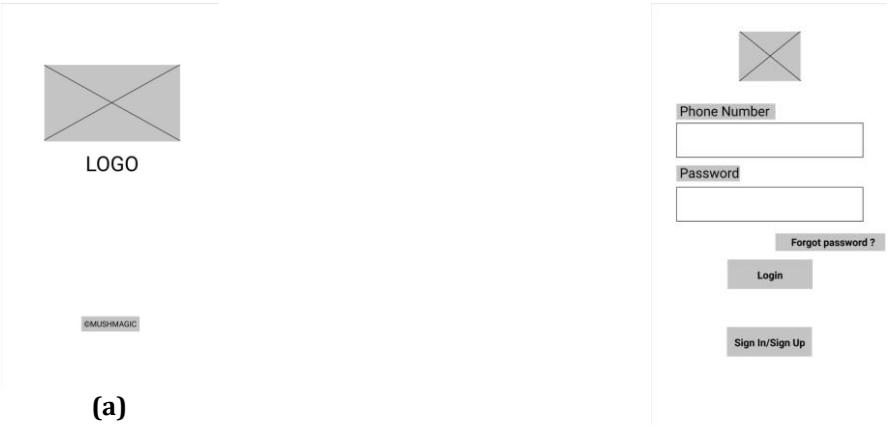


Fig.1 *System architecture of MushMagic*

The following are the tables from the database that have been designed and extracted from the class diagram. They were created using Microsoft SQL Server 2014.

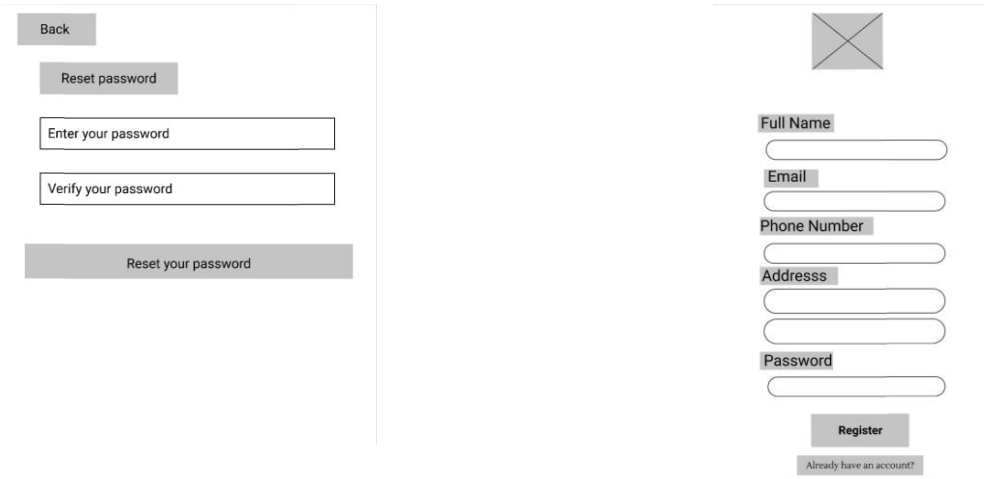
i. `User (email, name, password, profile_url, role, username)`
ii. `Product (created_at, description, discount, images, name, price, promotion, qty, total_revenue)`
iii. `Items (discount, product, price, qty)`
iv. `Promotion (name, product_id)`
v. `Orders (address, code, created_at, customer_name, delivery_fee, items, payment_method, phone, status, sub_total, total_discount, user_id)`
vi. `Address (details, full_address, latitude, longitude)`



(a) **(b)**

Fig. 2 *Interface of Mushmagic (a) Home page; (b) Login page*

User interface (UI) design is the process of creating the visual components that make up the interface of a product or service. For example, user interfaces consist of visual components such as colors and fonts [7]. Wireframing, or prototyping, is a common step in the user interface process. The goal of UI design is to create products that are easy to use, attractive, and help people achieve their goals efficiently and effectively. For this project, I used Figma to create user interface design wireframes. In Figure 2, interface of MushMagic 2(a): home page 2(a), Figure 2(b): Login page(b). In Figure 3, interface of MushMagic 3(a): reset password page 3(a), Figure 3(b): register page(b). In Figure 4, interface of MushMagic 4(a): customer profile page 4(a), Figure 4(b): product page(b). In Figure 5, interface of MushMagic 5(a): customer cart page 5(a), Figure 5(b): place order page(b).



(a) **(b)**

Fig. 3 *Interface of MushMagic (a) Reset password page; (b) Register page*

(a) **(b)**

Fig. 4 *Interface of MushMagic(a) Customer profile page (b) Product page*

(a) **(b)**

Fig. 5 *Interface of MushMagic (a) Cart page (b) Place order page*

4. Results and Discussion

This section provides an overview of the outcomes of the system implementation and testing. The system was developed using the Flutter framework and the Dart programming language for coding, while Firebase was used as the

database. The major Integrated Development Environment (IDE) used for writing and debugging the code was Microsoft Visual Studio Code, whereas Android Studio was used for running the emulator during testing.

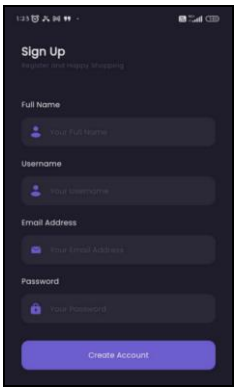


Fig.6: *Sign up interface*

Figure 6 shows the signup interface of the Mushroom Ordering Application.Table 5 lists user management module test scenarios. Administrators, staff, and customers may securely register and access the system using this module. The main purpose is to verify that users may establish accounts, log in, and not use erroneous credentials. Table 5 shows all seven test cases passed.

Table 5: *Test case for user management module*

Test Case ID	Description	Expected Result	Actual	Pass/Fail
M1-1	To check whether a customer can register an account	The user should be able to create an account	The user has successfully created an account.	Pass
M1-2	To check whether a customer can log into the system	The user should be able to log into the system	The user has successfully logged into the system	Pass
M1-3	To check whether a customer can reset their password	The user should be able to reset their password	The user has successfully reset their password	Pass
M1-4	To verify email validation during forgot password	The system should validate the email format	The system validated the email format correctly	Pass
M1-5	To ensure session management upon login	The user should remain logged in during active sessions	The user remained logged in during active sessions	Pass
M1-6	To check whether an admin and staff can log into the system	The user should be able to log into the system	The user has successfully logged into the system	Pass
M1-7	To check whether the admin can add a staff account	The admin should be able to add a staff account	The admin successfully activated the account	Pass

Administrators and staff obtain dashboards when accessing MushMagic. The system determines the user's job and directs them to the administrative or staff dashboard. The admin panel gives administrators full access to all system components. Administrators may easily scroll the sidebar to see total products, transactions, personnel, and customers. Figure 7 displays admin dashboard interfaces.

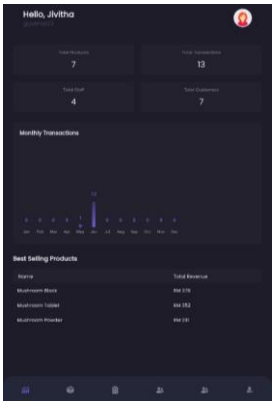


Fig. 7: Interface of admin dashboard

Table 6 lists Admin and Staff dashboard test cases. Administrators manage items, transactions, staff, and customers via the Admin Dashboard, which offers them full access to all system modules. However, the admin Dashboard gives staff a customized view to manage everyday operations. Testing ensures both dashboards work smoothly and securely, boosting the MushMagic Application's productivity. All three test cases pass in Table 6.

Table 6: *Test case for admin dashboard and staff Module*

Test Case ID	Description	Expected Result	Actual	Pass/Fail
M2-1	To check whether the system could display the dashboard for both administrator and staff	The system should be able to display the dashboard for both administrator and staff	The system has successfully displayed the dashboard for both the administrator and staff	Pass
M2-2	To check whether the administrator and staff can navigate through other modules	The user should be able to navigate through other modules	The user has successfully navigated to other modules	Pass
M2-3	To verify report viewing functionality	Staff and Admin should view specific reports	The staff and admin viewed specific reports	Pass

The MushMagic Application's Order Management Module streamlines the whole ordering process. This module makes it easy for customers to place orders, track, and observe their order history. The module gives administrators and staff a complete interface to manage orders, change order statuses, and answer customer questions. The Order Management Module securely stores order data in Firebase. Figure 8 demonstrate the MushMagic Application's Orders page, cart contents, order status, and checkout procedure.

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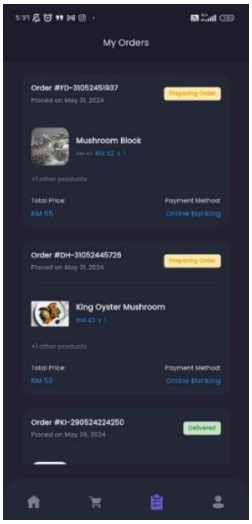

Fig. 8 *Interface of the orders page for customers*

Table 7 shows the test cases for the order management module. This module has undergone significant testing to guarantee that orders are processed accurately and promptly, improving customer satisfaction and operational effectiveness. All seven test cases pass in **Table 7**.

Table 7: *Test case for order management module*

Test Case ID	Description	Expected Result	Actual Result	Pass/Fail
M3-1	To check if customers can place orders	Customers should be able to place orders	Customers successfully placed orders	Pass
M3-2	To verify order tracking functionality	Customers should be able to track their orders	Customers successfully tracked their orders	Pass
M3-3	To check if admins and staff can view new orders	Admins and staff should view new orders	Admins and staff successfully viewed new orders	Pass
M3-4	To verify the ability to update order statuses	Admins and staff should update order statuses	Admins and staff successfully updated order statuses	Pass
M3-5	To check notification functionality for order updates	Customers should receive notifications for order updates	Customers received notifications for order update	Pass
M3-6	To verify the ability to handle order cancellations	Customers should be able to cancel orders	Customers successfully canceled orders	Pass
M3-7	To verify order history management	Customers should view their order history	Customers successfully viewed their order history	Pass

MushMagic's Product Management Module lets users interact with the app's various mushroom goods. This module enables customers easily browse a variety of mushroom products. The Product Management Module gives customers product information, quantities, and the option to browse product categories to make informed purchases. The system also manages inventory and administrative updates, helping the administrative staff keep the product list organized. Figure 9 demonstrates the MushMagic Application's product page layout with clear photos, pricing, and availability information. Figure 10 shows the product interface for administrator and staff

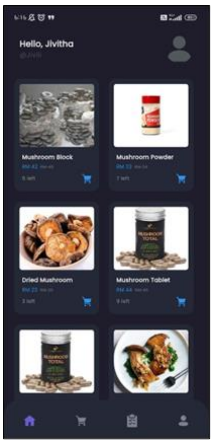

Fig. 9 *Product page interface*

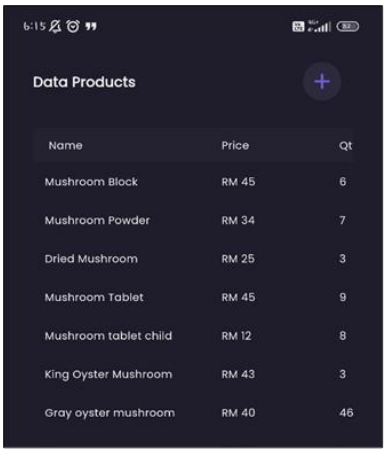

Fig. 10 *Product interface for administrator and staff*

Table 8 details the product management module test cases. It ensures all capabilities have been tested and meet requirements. Successful testing improves the MushMagic Application's user experience and operational efficiency by ensuring product information management. All five test cases pass in **Table 8.**

Table 8 *Test case for product management module*

Test Case ID	Description	Expected Result	Actual Result	Pass/Fail
M4-1	To check if admins and staff can add new products	Admins and staff should add new products	Admins and staff successfully added new products	Pass
M4-2	To verify the ability to update, and delete, product details	Admins and staff can update and delete product.	Admins and staff successfully updated and deleted product.	Pass
M4-3	To check the integration of product management with inventory management	Product updates should reflect in the inventory	Product updates reflected in the inventory	Pass
M4-4	To ensure accurate display of product information for customers	Customers should see accurate product information	Customers saw accurate product information	Pass
M4-5	To ensure secure access to product management functions	Only staff and administrator should access product management	Only staff and administrator accessed product management	Pass

The MushMagic app prioritizes customer secure payment and convenience. To achieve this, integrated with Stripe, a renowned online payment processing platform. Customers pay by internet banking, credit/debit cards, or cash on delivery using Stripe. Use Stripe's test mode to duplicate transactions during testing to analyze payment flow before going real. Figure 11 illustrates the user interface and code segment of the payment process for customers.

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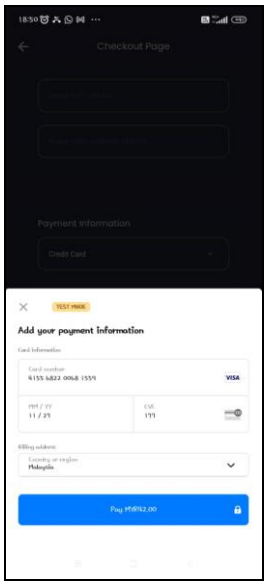

Fig.11 *Payment interface for customer*

Table 9 shows the Financial Management Module's five test cases, confirming that all functionalities were tested and passed the requirements. Successful tests ensure the MushMagic Application's financial well-being and operational success by managing all financial transactions correctly and securely.

Table 9: *Test case for financial management module*

Test Case ID	Description	Expected Result	Actual Result	Pass/Fail
M5-1	To check if the system accurately records customer payments	The system should record all customer payments accurately	The system successfully recorded all customer payments	Pass
M5-2	To ensure secure access to financial data	Only authorized users should access financial data	Only authorized users accessed financial data	Pass
M5-3	To check the accuracy of financial summaries and dashboards	Financial summaries and dashboards should be accurate	Financial summaries and dashboards were accurate	Pass
M5-4	To verify notification functionality for financial transactions	Users should receive notifications for relevant financial transactions	Users received notifications for relevant financial transactions	Pass
M5-5	To check the functionality of setting and managing budgets	Admins should set and manage budgets effectively	Admins successfully set and managed budgets	Pass

The Data Analysis and Reporting Module of the MushMagic Application finds important patterns and insights in the system's huge amount of data. This feature collects, analyses, and presents sales, customer, and profitability data. Administrator and staff members can make better decisions and enhance corporate operations. The MushMagic Application environment requires the Data Analysis and Reporting Module for smart strategic choices and operational efficiency.

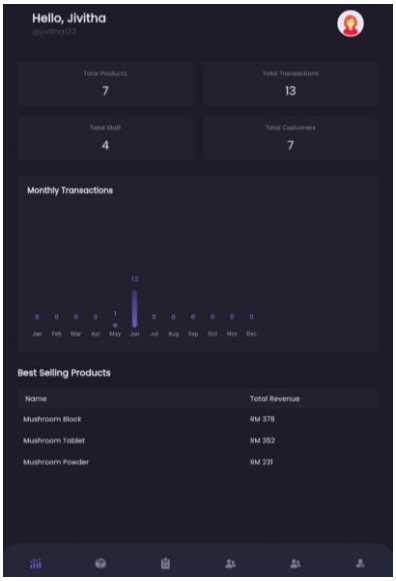

Fig.12 *Data analysis dashboard interface*

Table 10 details Data Analysis and Reporting Module tests. It ensures all capabilities have been tested and meet requirements. After successful testing, the system produces accurate, complete, and informative reports that allow effective decision-making based on data in the MushMagic Application.

Table 10*: Test case for data analysis and reporting module*

Test Case ID	Description	Expected Result	Actual Result	Pass/Fail
M6-1	To check if the system can generate sales reports	The system should generate accurate sales reports	The system successfully generated accurate sales reports	Pass
M6-2	To check if the system can generate inventory level reports	The system should generate accurate inventory level reports	The system successfully generated accurate inventory level reports	Pass
M6-3	To check the functionality of data visualization tools	The system should provide effective data visualization tools	The system successfully provided effective data visualization tool	Pass
M6-4	To ensure the accuracy and reliability of generated reports	Generated reports should be accurate and reliable	Generated reports were accurate and reliable	Pass

5. Conclusion

The report on the development and implementation of the MushMagic application for AGS Pro Enterprise provides a comprehensive overview of the project's objectives, methodologies, and outcomes. Through each chapter, the report illustrates the transformative impact of digital solutions on traditional business processes, particularly in the context of mushroom ordering and inventory management. The introduction establishes the necessity of transitioning from manual, error-prone methods to a streamlined, efficient digital system, while the literature review contextualizes this need by comparing existing solutions and highlighting the potential improvements offered by mobile applications. The methodology chapter details the systematic approach taken, employing the Agile model to ensure iterative development and continuous user feedback, facilitating the creation of a robust system tailored to AGS Pro Enterprise's needs. System analysis and design provide a technical blueprint for the application, showcasing comprehensive features in user management, order

processing, product management, financial management, and data analytics, underscoring thorough planning and precise execution. Testing and evaluation confirm that the MushMagic application meets all specified requirements, demonstrating reliability and effectiveness in real-world scenarios through detailed testing processes that ensure accurate and timely data for inventory and sales management. Overall, the MushMagic application represents a significant advancement for AGS Pro Enterprise, enhancing operational efficiency, customer satisfaction, and data-driven decision-making. While challenges such as internet dependency and the need for more advanced analytics remain, the application sets a strong foundation for future improvements and expansions, positioning AGS Pro Enterprise as a technologically adept and customer-focused business in the digital age.

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of the paper.

Author Contribution

The authors confirm contribution to the paper as follows: ***study conception and design:*** *Jivitha Guthangasolam, Mohamad Aizi Salamat;* ***data collection:*** *Jivitha Guthangasolam;* ***analysis and interpretation of results:*** *Jivitha Guthangasolam;* ***draft manuscript preparation:*** *Jivitha Guthangasolam. All authors reviewed the results and approved the final version of the manuscript.*

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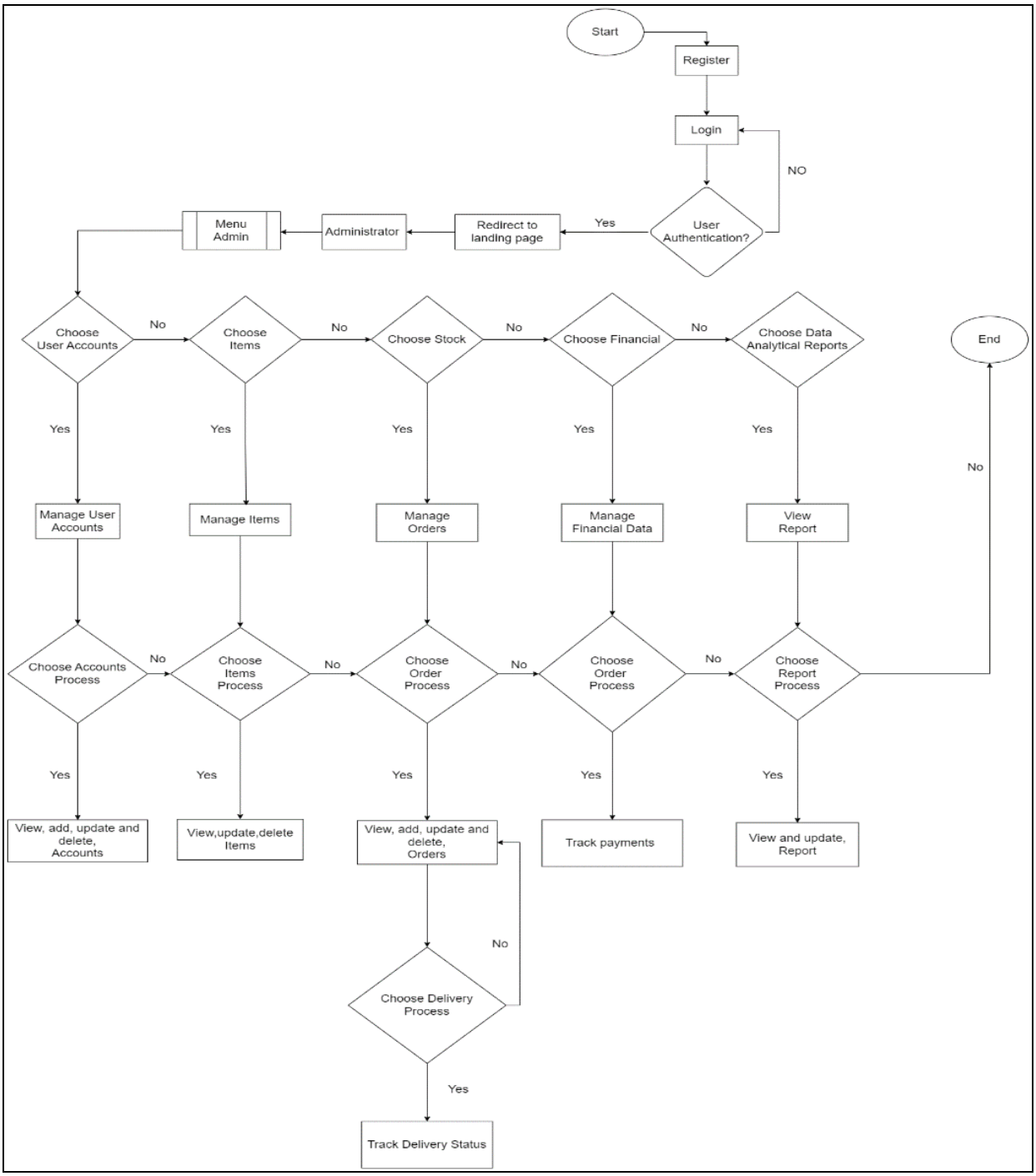
Appendix A: Flowchart for administrator of MUSHMAGIC



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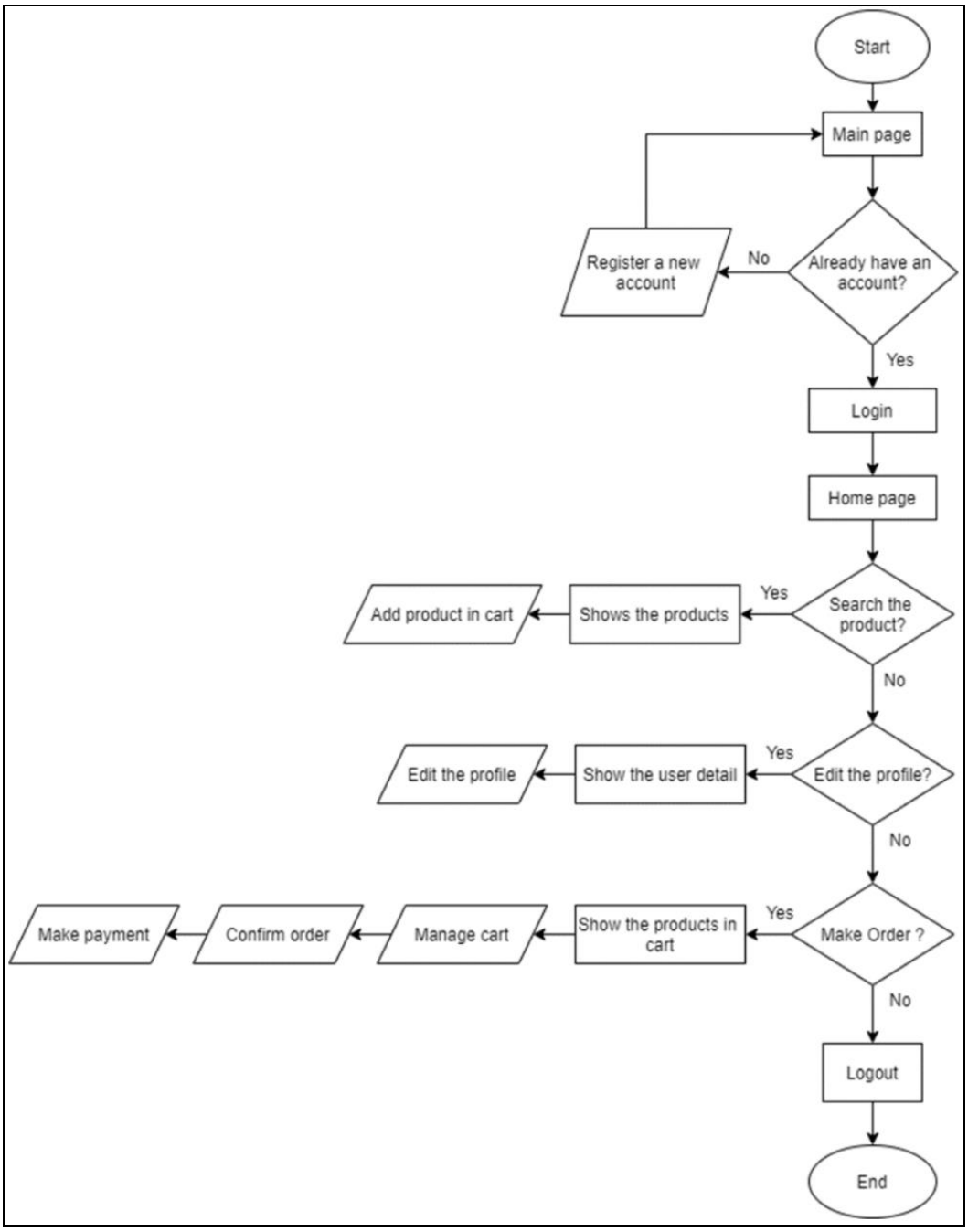
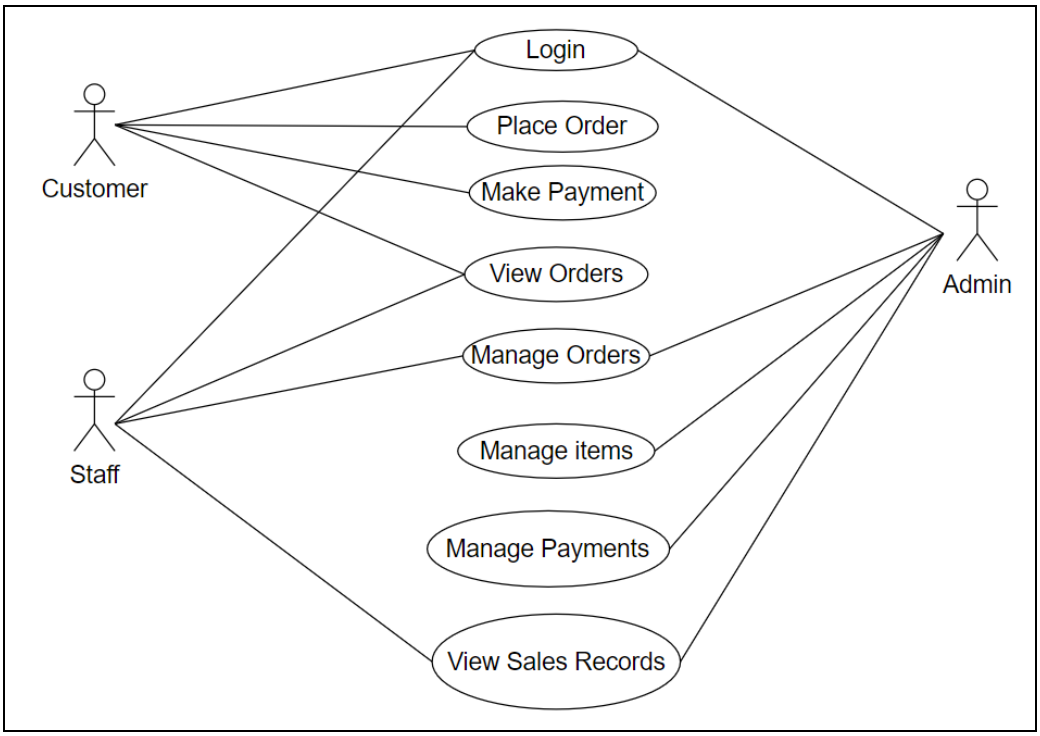
Appendix B: Flowchart for customer of MUSHMAGIC



Appendix C: USE Case Diagram of MUSHMAGIC



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Appendix D: Class Diagram of MUSHMAGIC