



Design and Development of Online Cooperative Management System for Sekolah Menengah Kebangsaan Muadzam Shah

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DOI: <https://doi.org/10.30880/aitcs.2026.07.01.024>

Article Info

Received: 12 June 2025

Accepted: 18 June 2026

Available online: 30 June 2026

Keywords

Web-based system, Cooperative Management System.

Abstract

The Online Cooperative Management System for SMK Muadzam Shah is a web-based platform designed to help parents and cooperative staff manage school cooperative tasks more efficiently. It replaces outdated manual processes such as product listing, administrative management, and user tracking that often led to delays and miscommunication. The system improves accessibility, streamlines operations, and enhances user engagement through a modern and user-friendly interface. Developed using PHP, HTML, CSS, and MySQL, the platform ensures secure and reliable data management. The project followed the Prototype Model, allowing for iterative improvements based on user feedback. The final system offers smoother transactions, better communication between stakeholders, and a significant improvement in cooperative operations. System testing has shown that the platform meets functional requirements and offers a reliable, user-friendly experience. This initiative represents a significant step toward advancing digital transformation in the educational sector, particularly in school-based cooperative management.

1. Introduction

In Malaysia, education emphasizes not only academic achievement but also the development of practical and entrepreneurial skills. School cooperatives play an essential role in this effort, providing students with hands-on business experiences and fostering their social and economic interests. These cooperatives, managed by students and teachers, supply everyday necessities such as stationery and snacks while promoting entrepreneurship [1]. Despite their importance, many school cooperatives in Sekolah Menengah Kebangsaan Muadzam Shah still operate using traditional manual processes, which can be inefficient, time-consuming, long queues during peak times, hard to manage product in and out by key in in the book or excel.

This project addresses several key issues based on the current situation in Sekolah Menengah Kebangsaan Muadzam Shah. Especially during student registration periods, parents often face difficulties due to long queues when purchasing school supplies at the cooperative. For those unable to attend in person, they are left with no choice but to give their children a large amount of money to buy the necessary items themselves. This raises concerns about the safety and responsibility of students carrying significant amounts of cash. Without a digital



system in place, parents are burdened with the need to leave work or disrupt their schedules for tasks that should ideally be completed quickly and efficiently.

The objectives of this project are to analyse and design a web-based cooperative management system for SMK Muadzam Shah that centralizes key operations such as inventory tracking, product purchasing, and user interaction into one accessible platform. The goal is to simplify cooperative processes and reduce reliance on manual tasks, especially during peak periods such as student registration. Furthermore, the project aims to develop a user-friendly, secure, and responsive system that addresses the core challenges faced by both cooperative staff and parents, offering a more efficient, convenient, and reliable solution for managing school-related purchases. Lastly, to evaluate the system's functionalities and determine whether the developed system meets all the requirements and expectations of the target user.

The project scope involves developing a web-based cooperative management system for SMK Muadzam Shah, designed for use by cooperative staff and parents only. Parents can register an account, add their children's information, view and order school items, and track their purchase history. The system includes features like a product catalog, shopping cart, and order tracking, with integrated online payment by using ToyyibPay. An admin dashboard allows staff to manage inventory, update orders, and handle user accounts, aiming to reduce long queues, minimize cash handling by students, and improve overall efficiency.

This report details the development of an Online Cooperative Management System for Sekolah Menengah Kebangsaan Muadzam Shah, structured into five chapters. The Introduction outlines inefficiencies in manual operations, while the Related Work justifies the web-based solution with features like real-time inventory tracking. The Methodology explains the Prototype Model's phases, followed by Result and Discussion showcases the system's architecture, requirements, and testing outcomes, supported by workflow diagrams and data models. The System Implementation and Testing include system architecture and function testing. Finally, the Conclusion summarizes achievements and future enhancements. The project systematically transitions from problem analysis to solution delivery, ensuring an efficient, user-friendly platform for the school cooperative.

2. Related Work

Cooperative management system gives solutions simplify the organization and transaction procedures for member-based communities, meeting the demand for organized and transparent operations in educational institutions. These technologies help manage product sales, payments, and member interactions more efficiently. In education, the usage of digital technologies is consistent with Malaysia's national policy to improve ICT integration in schools [1]. Features such as role-based access control, online payments, and purchase history monitoring enhance accountability and user satisfaction.

Diefenbach et al. [9] highlight that prototyping and usability testing are essential for the successful adoption of systems, particularly in contexts where users have varying levels of digital literacy. Norhayate [2] underlines the significance of usability and system responsiveness in encouraging the use of cooperative platforms in educational settings. By providing standardized procedures and secure access, these solutions help reduce human errors and enhance operational efficiency.

2.1 A Study on Similar Systems

School cooperatives serve as essential facilities that provide students with access to affordable school necessities such as uniforms, stationery, and snacks. Prices offered through school cooperatives are typically lower compared to external retail outlets, making them a practical choice for parents and students. In recent years, especially after the COVID-19 pandemic, the popularity of e-commerce and online platforms has surged, changing consumer behavior and increasing the demand for more convenient and accessible services. With growing digital literacy among the public, there is a greater expectation for services to be available online. This shift presents an opportunity for school cooperatives to modernize their operations by adopting digital solutions. By implementing an online cooperative system, schools can streamline inventory management, reduce waiting times during peak periods such as student registration, and provide a more efficient shopping experience for parents. This approach not only aligns with current digital trends but also enhances service operation in the institute environment such as for UNIMAP [3], SMKTPM [4], and SMAD [5].

The UniMAP Alumni Cooperative (Koperasi Alumni UniMAP) operates as a campus-based e-commerce platform, mainly serving alumni [3]. It offers branded merchandise such as T-shirts, hoodies, mugs, phone cases, and hats. Key features include product listings, shopping cart, user profiles, membership registration, promotional offers (e.g., free delivery over RM150, first-time discounts), clear pricing, customer reviews, an archive section, and access to courses. Online payment options for membership fees are also available. However, the system lacks some useful features that could improve user experience, such as advanced search or filters, real-time chat

support, notifications for orders or promotions, and order history or wishlist options. These missing elements limit the platform's convenience for users and administrators.

The Sekolah Menengah Kebangsaan Tinggi Perempuan Melaka (SMK TPM) website serves as an information center for students, parents, and staff [4]. Its homepage features a simple layout with the school logo and a navigation menu linking to sections like departments, extracurricular activities, and the school cooperative. The cooperative section briefly outlines its role and services, but lacks a detailed product catalog, pricing, or real-time stock updates. As a result, users must visit the cooperative in person to make purchases. While the website is functional, it could be improved with features such as product search, real-time service updates, and online payment options to enhance convenience and align with current user expectations.

The Koperasi SMAD website, developed for Sekolah Menengah Agama Darusaadah, aims to provide students, staff, and members with access to cooperative services and products [6]. However, it faces key issues such as broken links and 404 errors on important pages like the product catalog and membership section, limiting user engagement. Additionally, the site lacks essential features like online payment options, real-time inventory updates, and mobile responsiveness. A more user-friendly design would also improve accessibility across devices. Overall, while the website has potential to support cooperative operations, technical issues and missing features currently reduce its effectiveness.

In comparison to Koperasi Alumni UniMAP, Sekolah Menengah Kebangsaan Tinggi Perempuan Melaka (SMKTPM) Website, Sekolah Menengah Agama Darusaadah (SMAD) Website, the proposed Online Cooperative Management System for Sekolah Menengah Kebangsaan Muadzam Shah (SMKMS) Website provides a more efficient and tailored cooperative operations for parents and cooperative staff. As shown in Table 1. It overcomes Koperasi Alumni UniMAP limitations by including payment gateway, secure payment, order history tracking, good menu design, and user management.

Table 1 Comparison of existing systems with proposed system

System Feature	Koperasi Alumni UniMAP [3]	SMKTPM website [4]	SMAD website [5]	Proposed System (Online Cooperative Management System for SMKMS)
Profile Management	√	X	X	√
User Authentication	√	X	X	√
Pricing Detailed	√	X	√	√
Item Descriptions				
Payment Gateway	√	X	X	√
Advanced Search & Filters	X	X	X	√
Secure Payment Processing	√	X	√	√
Shopping Cart	√	√	√	√
Rating & Reviews	√	X	√	√
Notifications	X	X	√	√
Administrator Dashboard	X	X	√	√

2.2 Technology Used

The Online Cooperative Management System for Sekolah Menengah Kebangsaan Muadzam Shah is developed using dependable technologies to ensure it runs efficiently, is easy to use, and can grow with future needs. The system is built with Hypertext Preprocessor (PHP), It allows developers to build secure, scalable, and user-friendly systems that handle tasks such as form processing, session management, and user authentication [6] a widely used server-side language that works seamlessly with Structured Query Language (MySQL). MySQL will be used to manage inventory records, sales data, and user information in real time, ensuring data accuracy and consistency [7]. To make payments more convenient and secure, the system integrates ToyyibPay which is a Shariah-compliant payment gateway that supports FPX or online banking, making payment collection and transfers simple and safe [8].

This system includes a range of useful features tailored to the school's needs. The administrator dashboard allows staff to manage user roles, cooperative stock, and generate reports. Parents can register and log in securely, view available products, and track their order history. Each parent account is linked to their child's information, which helps streamline communication and record-keeping. The inventory management feature ensures product availability is always up to date, while the system's responsive design makes it accessible on both desktop and mobile devices. Overall, this platform provides a modern, user-friendly solution that improves the efficiency of cooperative operations and enhances the experience for both staff and parents.

3. Methodology

3.1 Prototype Model

The Prototype Model has been chosen as the development methodology for this project. This approach focuses on building an early version of the system to test functionality, gather feedback, and refine requirements before developing the final product. It allows developers to quickly create a working model, which can be demonstrated to users and stakeholders for evaluation and suggestions. Prototyping helps confirm that the system works as expected and allows changes based on user feedback [9]. As illustrated in Figure 1, the prototype model includes six key phases: planning, analysis, design, development, testing, and implementation.

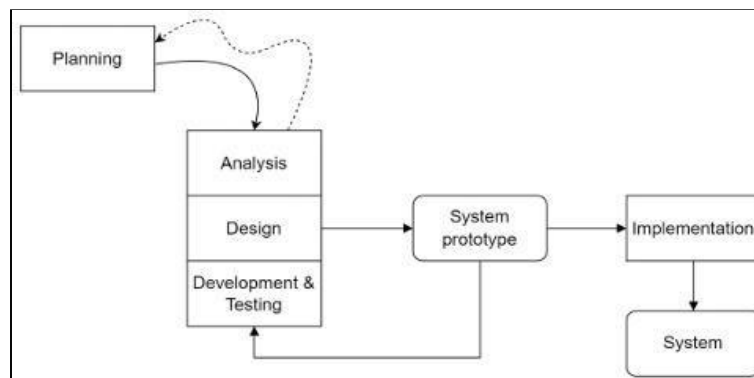


Fig. 1 *Prototype Model* [10]

3.2 Phases in Prototype Model

The Online Cooperative Management System for Sekolah Menengah Kebangsaan Muadzam Shah was developed using the Prototype Model to modernize the school cooperative's operations, which emphasizes iterative development, user feedback, and continuous refinement. The project began by identifying key challenges including manual inventory tracking, and inefficient sales processes. These issues were particularly problematic during peak periods like student registration, creating long queues and administrative bottlenecks.

A detailed Gantt chart (Appendix A) was created to schedule tasks and ensure timely progress. This was followed by the analysis phase, which involved gathering both functional and non-functional requirements through interviews with cooperative staff. This helped highlight issues such as inefficiencies in manual inventory. Visual tools like data flow diagrams (DFD), flowcharts, and entity-relationship diagrams (ERD) were used to map out the system's processes and structure. In the design phase, wireframes were created using Draw.io to visualize user interface elements and navigation flows, while the database schema was designed to ensure structured data management and minimize redundancy.

The system design focused on user-friendly interfaces with intuitive navigation. Staff dashboards were optimized for inventory and end-user site, while student and parent interfaces simplified the purchasing process. The system's features using PHP for the backend and HTML, CSS, and JavaScript for a responsive and user-friendly interface, with MySQL handling database operations. Prototypes were iteratively built and refined based on user feedback, followed by rigorous testing, including User Acceptance Testing (UAT), to ensure system stability and usability.

Lastly, in the implementation phase, the system was deployed with hosting for real-time use, with final adjustments made based on stakeholder input. The system is now fully operational and supports the cooperative's day-to-day tasks more efficiently and reliably.

3.3 Summary of Activities

The system development follows several main steps. First, the Planning phase sets the project goals and identifies problems with the current manual cooperative process. Next, in the Analysis phase, information is gathered from interviews to understand what users need. The Design phase focuses on planning how the system will look and how the data will be organized. In the Implementation phase, the system is built and connected to a database. Finally, during the Testing phase, the system is checked to make sure it works properly and is easy to use.

Table 2 *System Development Workflow of the Developed System*

Phase	Task	Deliverables
Planning	- Identify problem statements, objectives, project scope, expected result and project significance. - Research on school cooperative topics.	- Project proposal - Gantt chart
Analysis	- Construct meeting and interview with Puan Yusmaliza Binti Mamat as a Cooperative Supervisor. - Gather information about user requirements. - Comparison between existing system and proposed system. - Requirement gathering. - Identify functional and non-functional requirements. - Identify relationships between processes, data and entities.	- User requirements. - Hardware and Software requirements. - Comparison report. - Requirements document. - Functional and non-functional requirements. - Flowchart for all users. - Context Diagram. - Data Flow Diagram (DFD) - Entity Relationship Diagram (ERD).
Design	- Design wireframe. - Database design. - The prototype is finalized.	- Wireframe - Database schema design. - Data Dictionary.
Development	- Develop system modules. - Implement database operations. - Develop key functionalities. - Integrate front-end and back-end components.	- Functional system prototype. - Connect database with sample data.
Implementation	- Connect system with database. - The proposed system is developed.	Fully developed proposed system.
System Testing	- System testing. - Identify areas for improvement. - Finalizing the latest development. - Provide ongoing maintenance and support for the system.	- Correcting and improving defects. - The most recent system has been completed and is set for release.

4. Result and Discussion

4.1 System Analysis

System analysis plays a key role in shaping the structure and direction of the proposed system. It begins with a Context Diagram that displays the interaction between external entities and the system, followed by a Data Flow Diagram (DFD) that provides a deeper view of how data moves within the system. These diagrams help in understanding the system's needs and creating effective workflows. This section begins by stating both functional and non-functional requirements. Table 3 presents the functional requirements, which describe the tasks, actions, or features the system must carry out to fulfill user needs and objectives.

Table 3 *Functional requirements of the proposed system*

No	Module	Submodules	Functional Requirements
1	User Management	User Login and Register	▪ The system should allow users to register via full name, ic number, email, phone number, and add their children (student) information. ▪ The system should allow users to log in using their registered credentials via ic number and password. ▪ The system should provide mechanisms for users to recover forgotten passwords securely.
		Profile Management	▪ The system should allow users to create profiles, including personal details, payment methods, and account settings. ▪ The system should allow users to edit and manage profiles, including updating personal details, payment methods, and account settings. ▪ The system should allow users to update their password.
2	Advanced Search & Filter		▪ The system should provide advanced search functionality with filters by category or options.
3	Order Processing		▪ The system should allow user to validate and process user orders by checking inventory availability. ▪ The system should allow user to generated order history, and notify user of their order status. ▪ The system should allow user to update the items in cart. ▪ The system should allow the user to add to cart items for rent.
4	Payment Processing		▪ The system should integrate with multiple payment gateways to support various payment methods. ▪ The system should handle security deposits. ▪ The system should allow users to request for a refund.
5	Feedback		▪ The system should allow user to leave a review or comment.

Based on Table 4 below presents the non-functional requirements of the system, which outline the quality attributes and operational criteria necessary for effective and reliable performance. These requirements include aspects such as scalability, security, reliability, usability, performance, and maintainability. Together, they ensure that the system not only functions correctly but also meet user expectations in terms of efficiency, safety, and ease of use.

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

No	Modules	Non -Functional Requirements
1	Security & Compliance	▪ The system should allow only valid users to log in into their accounts using their ic number and password. ▪ The system should use encryption to protect sensitive data. ▪ The system should provide mechanisms for users to recover forgotten passwords securely.
2	Performance	▪ Ensure the system operates efficiently, handling many users and transactions simultaneously without degradation. ▪ The system should be able to respond fast within 3 seconds under normal operating conditions and perform the desired output to users. ▪ The system should be able to use anytime
3	Operational	▪ The system should be user-friendly ▪ The system should be run across all devices

4.1.1 Flowchart

A flowchart provides a visual guide to the system's processes. In (Appendix B) presents the user flowchart for Online Cooperative Management System for SMK Muadzam Shah, showing how end-users interact with the system. The process begins with account registration or login, including an option to reset the password if needed. Once logged in, users arrive at the homepage, where they can perform actions such as manage profile, shopping product, see order history, read information at "About" page, contact us, and manage cart. Each step follows a logical order, ending either at the homepage or with the user logging out.

4.1.2 Context Diagram and Data Flow Diagram (DFD)

The Context Diagram illustrates how external users interact with the Online Cooperative Management System. It provides a high-level overview of the system's operations and the roles of both parents and cooperative staff. In this system, parents can register, log in, update their profiles, manage their child's information, browse available items, add items to the cart, place orders, and view order history. Cooperative staff are responsible for managing inventory, processing orders, updating item listings, verifying parent accounts, and generating reports. The system serves as the central platform that facilitates communication and smooth data exchange between parents and staff.

A Data Flow Diagram (DFD) visually represents how data moves through the system. It breaks down system functions into smaller processes, making it easier to understand and analyze. Key components include external entities, processes, data flows, and data stores. At Level 0, the system consists of major processes such as registration, login, child information management, inventory management, order placement, and report generation. Corresponding data stores include user accounts, student data, item inventory, order records, and transaction history. The two main external entities are parents and cooperative staff. The Level 0 DFD is provided in (Appendix C).

4.1.3 Entity Relationship Diagram

The Entity Relationship Diagram (ERD) is developed to help understand the core data and information that will be stored and managed within the Online Cooperative Management System. It outlines the structure of the database by presenting the entities and the relationships among the tables, serving as a guide for designing an organized and efficient data model. The ERD ensures that all data components such as user accounts, student details, inventory items, and orders are clearly defined and properly related to one another. For this system, the key tables include users, children, payments, order_items, orders, products, user_cart, and contact_messages. Each table is built with specific attributes and serves distinct functions within the system. These tables are interconnected through logical relationships that support core system operations, such as user registration, item purchases, inventory tracking, and reporting. The ERD of the proposed system is shown in (Appendix D).

4.2 System Design

After collecting system requirements during the analysis phase, the project progresses to the design phase, where the database and user interface are carefully planned. The database design plays a key role in organizing, storing, and managing important data such as user accounts, student information, inventory, and orders. A well-structured database ensures smooth operations and accurate data handling. At the same time, the user interface is designed to be simple and user-friendly, allowing parents and cooperative staff to use the system easily, whether they are registering, managing stock, or placing orders. These design activities form a clear framework that guides development and ensures the system is practical, efficient, and tailored to user needs.

4.2.1 Database Design

The database design focuses on organizing, storing, and managing data in a way that ensures accuracy, smooth performance, and future scalability of the system. It involves creating a structure that clearly defines how different types of information, such as parent accounts, student details, cooperative inventory, and orders are connected and stored. The design also includes techniques like normalization and indexing to make data retrieval faster and more efficient. By following this approach, the database can handle daily operations reliably while also explaining the reasons behind key design decisions, helping users and developers better understand how the system manages and protects important data.

4.2.2 User Interface Design

User interface (UI) is designed to ensure that parents and cooperative staff can interact with the system in a simple, clear, and user-friendly way. A well-designed UI makes it easier to navigate menus, fill out forms, and complete tasks such as viewing student information, placing orders, or managing inventory. Wireframes were used during the design stage to outline the basic layout of each page, showing where key elements like buttons, menus, and input fields would be placed. This step helped ensure the overall flow and functionality met user needs before applying visual details such as colors, fonts, and styling in the final design.

The image shows a web browser window displaying a registration page for a school cooperative. The page has a red header bar with the school's logo and name on the left, and navigation links ('MAIN Login', 'user-ID Register') and a menu icon on the right. The main content area is white and contains a 'Register Account' form. The form has several input fields: 'IC No (user-ID)', 'Full Name', 'Email', 'Gender', 'Age', 'Role', 'Phone No', 'Password', and 'Password Confirmation'. Below the form are two buttons: 'Cancel' and 'Register user-ID'. The page has a black footer bar with three 'INFO' links. The browser's address bar shows 'smkms.com'.

Fig. 2 User interface design Registration Page.

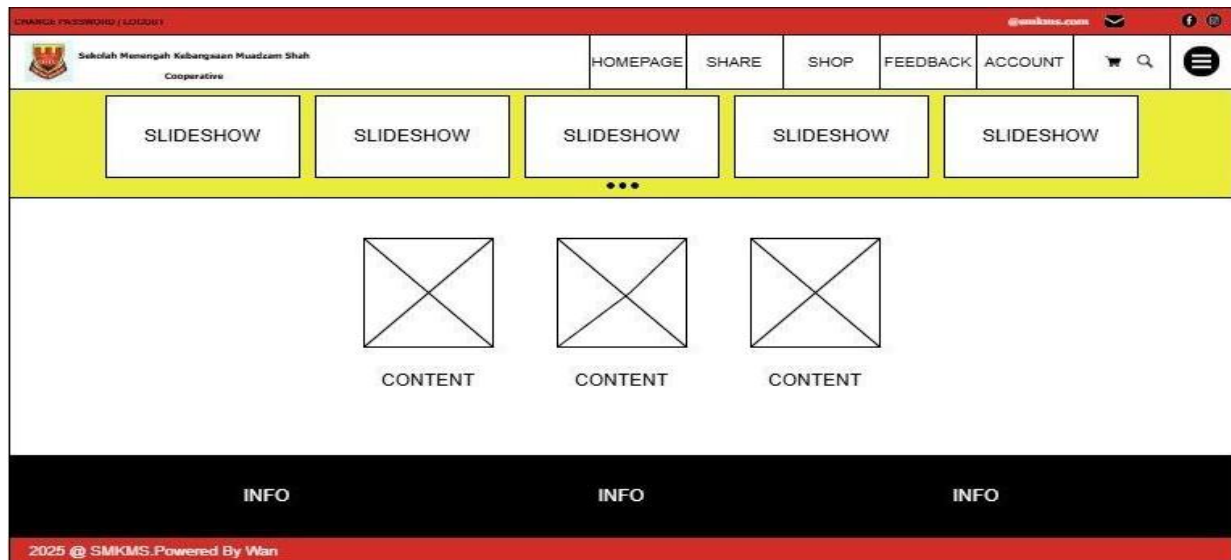


Fig. 3 User interface design Home Page.

5.0 System Implementation and Testing

This section presents the implementation and testing of the web-based system developed for the school cooperative. While the system includes multiple modules, only the ordering feature is highlighted in this section due to space limitations. The focus is on key user actions involved in placing orders and how the system supports these processes. It also includes testing conducted on this feature to demonstrate the system's core functionality and ensure it operates effectively for parents and cooperative staff.

5.1 Implementation

The primary goal of the implementation phase is to ensure that the Online Cooperative Management System is developed according to the specifications outlined during the analysis and design phases. This stage focuses on translating the planned features into a functional system that meets the needs of parents and cooperative staff. Figure 4 shows the registration interface, where users can enter their personal information to create an account before accessing the system's services.

Fig. 4 User registration interface

Figure 5 shows the part of the code responsible for handling the registration process, including password validation, duplicate checks, and securely saving the user's information

```

if (isset($_POST['register'])) {
    // User information
    $user_name = trim(string: $_POST['user_name']);
    $user_ic = trim(string: $_POST['user_ic']);
    $email = trim(string: $_POST['email']);
    $phone = trim(string: $_POST['phone']);
    $password = $_POST['password'];
    $confirm_password = $_POST['confirm_password'];
    $role = 'parent';

    // Child information (array of children)
    $child_names = $_POST['child_name'];
    $child_ics = $_POST['child_ic'];
    $child_genders = $_POST['child_gender'];
    $child_forms = $_POST['child_form'];

    // Validate passwords
    if ($password !== $confirm_password) {
        $errors[] = "Passwords do not match.";
    }

    // Check if user IC already exists
    $check_user = $conn->prepare(query: "SELECT user_id FROM users WHERE user_ic = ?");
    $check_user->bind_param(types: "s", var: &$user_ic);
    $check_user->execute();
    $check_user->store_result();

    if ($check_user->num_rows > 0) {
        $errors[] = "User with this IC number already registered.";
    }
}

```

Fig. 5 Code segment of user registration

To access the Online Cooperative Management System for Sekolah Menengah Kebangsaan Muadzam Shah, users need to provide their identification number (IC) and password. Figure 6 shows the login interface of the Online Cooperative Management System, where users enter their IC number and password, which are verified with the database to grant access or prompt a retry if incorrect.

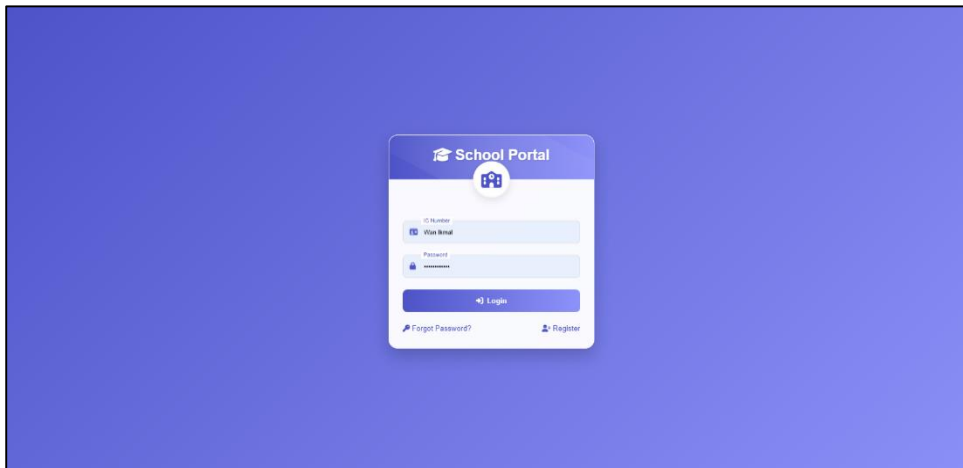


Fig. 6 User login interface

Figure 7 displays the code that manages the login process. This section includes the logic for verifying user input checking for matching records in the database, and determining whether to log the user in or prompt for correction.

```

if ($_SERVER['REQUEST_METHOD'] == 'POST') {
    $user_ic = mysqli_real_escape_string($conn, $_POST['login']);
    $password = $_POST['password'];

    // Debug output
    error_log(message: "Login attempt for IC: $user_ic");

    $sql = "SELECT * FROM users WHERE user_ic = '$user_ic'";
    $result = $conn->query($sql);

    if ($result->num_rows == 1) {
        $user = $result->fetch_assoc();

        if (password_verify($password, $password, hash: $user['password'])) {
            // Login successful - set session variables
            $_SESSION['user_id'] = $user['user_id'];
            $_SESSION['user_name'] = $user['user_name'];
            $_SESSION['role'] = strtolower(trim(string: $user['role']));
            $_SESSION['user_ic'] = $user['user_ic'];
            $_SESSION['login_time'] = date(format: 'Y-m-d H:i:s');

            // Update last login time
            $update_sql = "UPDATE users SET last_login = NOW() WHERE user_id = ?";
            $stmt = $conn->prepare($update_sql);
            $stmt->bind_param(types: "i", var: &$user['user_id']);
            $stmt->execute();
            $stmt->close();

            // Redirect based on role
            header(header: 'Location: ' . ($SESSION['role'] === 'admin' ? 'admin_dashboard.php' : 'user_index.php'));
            exit();
        } else {
            $error = "Invalid credentials. Please try again.";
        }
    } else {
        $error = "Account not found. Please check your IC number.";
    }
}
}

```

Fig. 7 Code segment of user login

Figure 8 displays the "Shop" page, which allows parents to browse and purchase items sold through the school cooperative. Users can view product names, descriptions, prices, are product is ready or pre-order and available quantities. Each item is accompanied by an image and organized under specific categories set by the cooperative staff. This ensures that the information provided is clear and helps users make informed purchasing decisions easily.

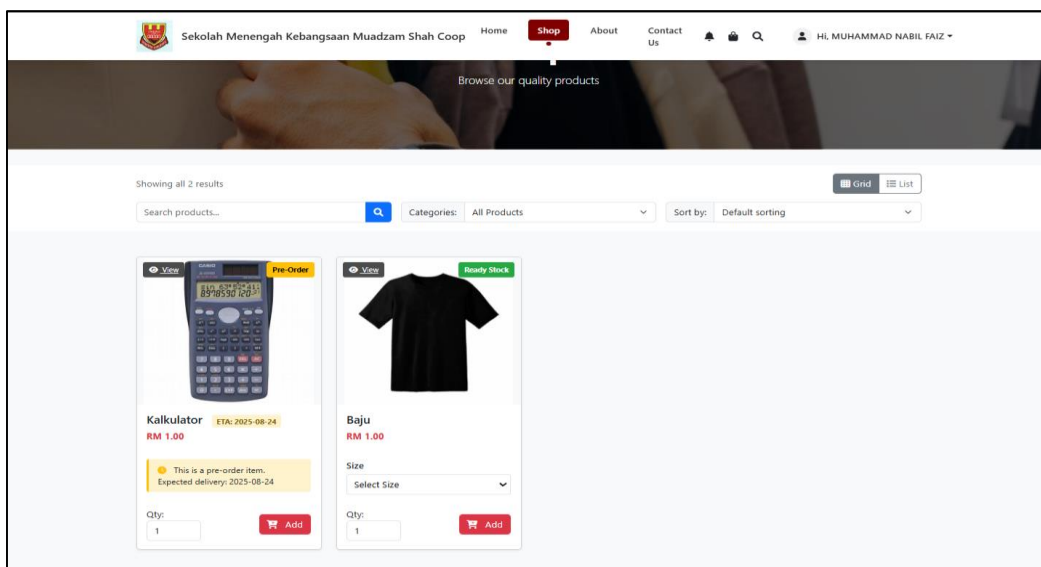


Fig. 8 Shop page interface

Figure 9 below is the Order Management Page for Administrator can view newly received orders on this page and update the order status between complete, pending, ready for pickup, or cancel. For cancellation, users who haven't completed payment can cancel their order by pressing the available button - this might be due to technical errors on the user's side. The cancellation request will be sent to the administrator for confirmation. However, for orders that have already been paid, the refund process is not yet available, so users need to contact the cooperative directly through the provided contact section, and the cooperative will notify them of the response.

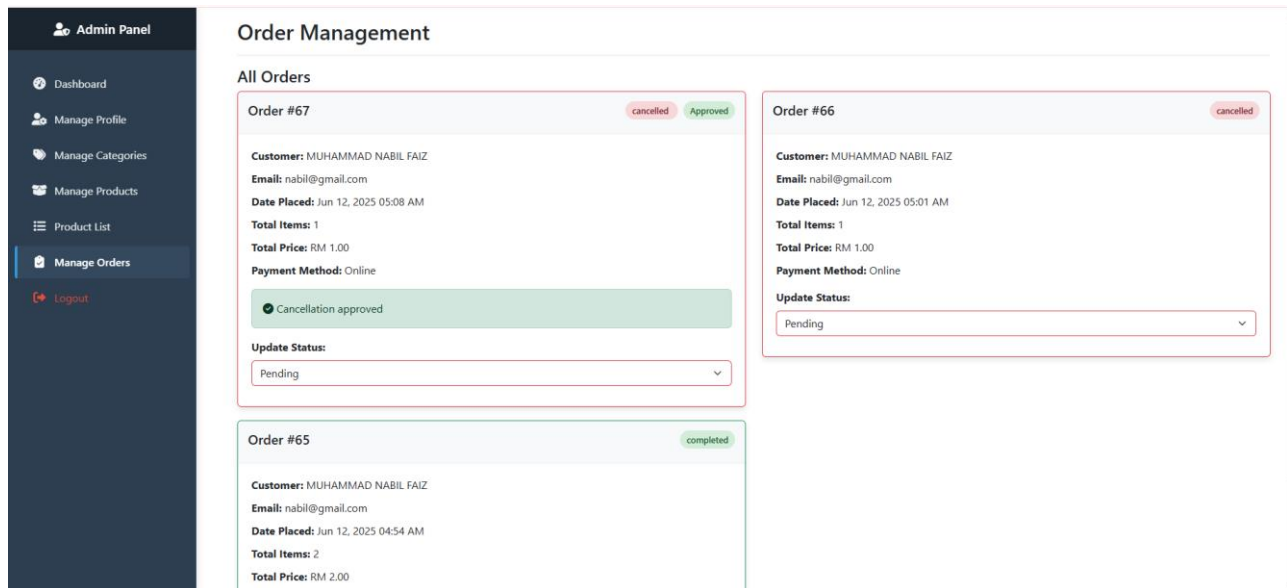


Fig. 9 Order Management page interface for Administrator.

Next, Checkout page provides a streamlined interface for finalizing purchases, ensuring users can review their order details and complete transactions efficiently. Key customer information, such as full name, email, and phone number, is pre-filled or required to ensure smooth communication and order processing. Users select a collection method in this case, "Pickup at School Cooperative" with a note clarifying that delivery options may incur additional fees, but right now the availability for delivery is not open. An optional order notes field allows for special requests, offering flexibility for personalized instructions. To accommodate diverse preferences, the page support "Online Banking" payment method. This flexibility caters to users' convenience while ensuring secure transaction options.

Furthermore, by integrating essential order details, flexible payment choices, and a transparent summary, the checkout page ensures clarity and confidence for users before they commit to their purchase. This design prioritizes usability while reducing potential friction in the transaction process.

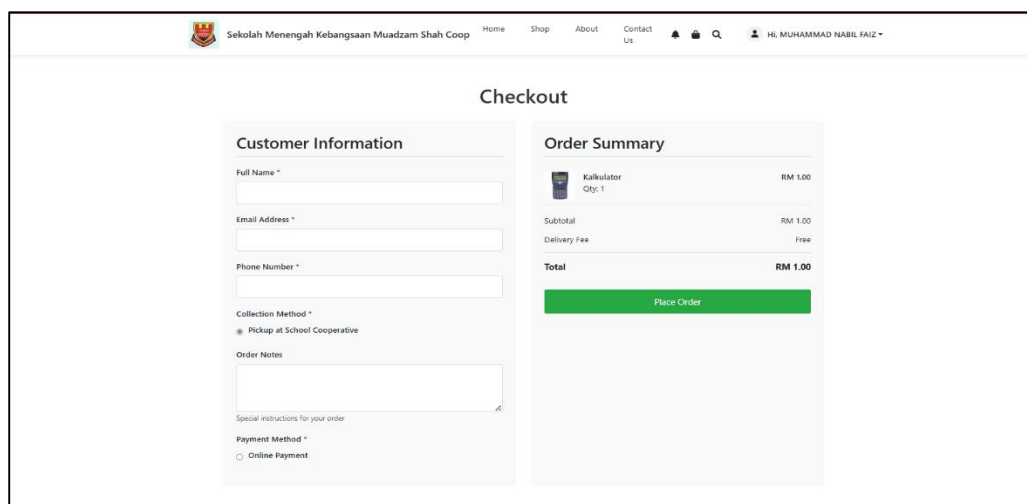


Fig. 10 Checkout page interface

Figure 11 shows the code responsible for handling payments made through online banking. Once the payment is completed successfully, the system saves the transaction information in the order history for record-keeping and tracking purposes.

```
// Create ToyyibPay bill
ToyyibPay.createBill(paymentData, function(response) {
  if (response.billCode) {
    // Redirect to ToyyibPay payment page
    window.location.href = 'https://payment.toyyibpay.com/' + response.billCode;
  } else {
    alert('Error creating payment: ' + (response.message || 'Unknown error'));
  }
});
});
```

Fig. 11 Checkout page interface

5.2 System Testing

System testing is a crucial step in ensuring that the built Online Cooperative Management System functions as planned across all primary modules and user roles. This phase comprises organized testing of user and administrator operations, with an emphasis on real-time performance, usability, security, and overall system integrity. The testing process comprised both functional and user acceptance testing (UAT). Test cases were designed to test system behavior under various scenarios. Each test scenario determined if the actual output matched the intended outcome. All test cases succeeded, demonstrating proper module execution. This certifies the system's suitability for deployment and is consistent with ISO/IEC 25010 quality criteria, including usability, dependability, and efficiency [9].

5.2.1 Functional Testing

Functional testing was conducted by running specific test cases for each module of the system to ensure that every function works as expected. This process involved defining test scenarios, creating relevant test cases, and comparing the actual outcomes with the expected results to detect and resolve any errors or inconsistencies.

5.2.2 Test Plan

A test plan is a detailed document outlining the testing strategy, objectives, timeline, resources, deliverables, and effort estimation for system validation. Its primary goal is to confirm that the implemented system fulfills all specified functional requirements. The testing process involves executing predefined test cases for each module to verify whether actual outputs match expected results. While the full test plan includes 7 tables covering different modules, only the test plan for the shop module and user management is shown below due to page limitations, but the expected result from the other modules testing is meet the user requirement and acceptance.

Table 5 *Application Testing for Online Cooperative Management System for SMK Muadzam Shah*

No	Function (User/Administrator Role)	Test Case	Expected Result	Actual Result
1	User Registration (User)	Fill details (name, ic number, child detail, email, password, phone number) and submit.	Account is created when the detail registered is still valid.	Pass
2	View Order History (User)	Navigate to order history page.	Displays past/pending orders with dates, items, and statuses.	Pass
3	Purchase Product (User)	Add item to cart, proceed to checkout.	System redirects to payment page. Order is recorded.	Pass
4	View Product Listings (User)	Browse marketplace or search for items.	Item appears under shop section.	Pass
5	Online Payment (User)	Select payment method, enter details, and confirm.	Payment is processed; order status updates to "Paid."	Pass
6	Leaver Review (User)	Rate product (1–5 stars) and submit feedback text.	Review appears under product listing; saved to database.	Pass
7	Product Listing (Administrator)	Upload product (name, image, price, category). Edit product details (e.g., price) and save. Delete product listing.	Product is published and visible to users. Changes reflect immediately in the marketplace. Product is removed from the marketplace.	Pass

5.3 User Acceptance Testing (UAT)

To assess system efficacy further, 11 participants (10 parents and 1 cooperating staff) took part in a User Acceptance Test (UAT). The test measured task performance, simplicity of use, and satisfaction across many modules, including user registration, order placing, profile updating, and payment processing.

5.3.1 User UAT

The questionnaire-based evaluation sought user feedback on system usability, design, and performance. Participants rated each feature on a scale of 1 to 5 (5 = excellent). Table 6 provides the combined results:

Table 6 *Result of overalled system developed from user*

No.	Features	Ranking					Total
		1	2	3	4	5	
1	Is the system easy to use and navigate without needing extra help or training?	-	-	-	3	7	4.7
2	Does the system perform all the expected functions correctly and without errors?	-	-	-	2	8	4.8
3	Are you satisfied with the overall design, performance, and features of the system?	-	-	-	3	7	4.7

Based on the results in Table 6, users gave positive feedback on the overall system. They found the system easy to use and navigate, with an average rating of 4.7. The system's functionalities were rated the highest at 4.8, indicating that it performs tasks correctly and reliably. Overall satisfaction with the system's design, performance, and features also scored 4.7. These results show that the system meets user expectations and is ready for use with only minimal improvements needed.

5.3.2 Administrator UAT

This section presents the administrator's overall experience and feedback regarding the functionality and usability of the developed system.

Table 7 Result of overalled system developed from administrator

No.	Features	Ranking					Total
		1	2	3	4	5	
1	Are all admin functionalities (e.g., user management, product updates, report viewing) working as expected and without errors?	-	-	-	-	1	5
2	Is the admin dashboard easy to navigate and does it provide quick access to all necessary tools and information?	-	-	-	-	1	5

This is the Open-ended question has been asked to administrator "Do you feel confident performing your administrative tasks using this system, and is there anything you feel is missing or could be improved?". The comment is "As a future administrator who will maintain this system, after observing the platform created for parents, I feel excited. This can serve as an innovation for the school to continue progressing in the ever-expanding IT era. For the improvement maybe can add the refund and dual-language so that it can be easier to user (parent) and cooperative staff. Overall, this system is good startup to bring this school improve."

6. Conclusion

The Online Cooperative Management System for Sekolah Menengah Kebangsaan Muadzam Shah was effectively created to achieve its primary objectives. It allows cooperative staff and parents to manage chores more effectively by moving away from manual techniques. The system makes school-related transactions faster, safer, and more comfortable by providing features such as secure user login, product browsing, order tracking, online payments using ToyibPay, and feedback posting. The Prototype Model enabled the developer to modify the system incrementally based on genuine user feedback.

Testing revealed that the system works properly and is simple to use. All primary aspects passed the test, and users were pleased with the outcome. During testing, the system reacted rapidly, even when several users were using it at the same time. Users gave an average satisfaction rating of 4.73 out of 5. Parents and staff considered the system to be straightforward and functional, demonstrating that the design meets their needs. This is consistent with other studies that emphasize the need for effective design and testing when developing school-based systems.

Several enhancements are planned for the future to improve the system even further. One suggestion is to include support for several languages, particularly English and Bahasa Melayu, so that all users can comprehend. Another significant change is to automate the refund process by connecting it directly to the payment system, allowing consumers to request refunds without contacting personnel. Other anticipated features include order pickup reminders and the ability to automatically deactivate accounts when a student leaves the school.

To summarize, this approach represents a significant improvement for the school's cooperative operations. It helps to prevent difficulties, saves time, and makes it easier for parents and staff to handle orders. The planned modifications will allow the system to evolve and deliver even greater service in the future.

Acknowledgement

The authors would like to thank the Faculty of Computer Science and Information Technology, Universiti Tun Hussein Onn Malaysia for its support.

Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

This journal requires that all authors take public responsibility for the content of the work submitted for review. The contributions of all authors must be described in the following manner:

*The authors confirm contribution to the paper as follows: **study conception and design:** Wan Ikmal Azizi Wan Junizam Norfaradilla Wahid; **data collection:** Wan Ikmal Azizi Wan Junizam; **analysis and interpretation of results:** Wan Ikmal Azizi Wan Junizam, Norfaradilla Wahid; **draft manuscript preparation:** Wan Ikmal Azizi Wan Junizam, Norfaradilla Wahid. All authors reviewed the results and approved the final version of the manuscript.*

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Appendix A

Gantt Chart for Progress

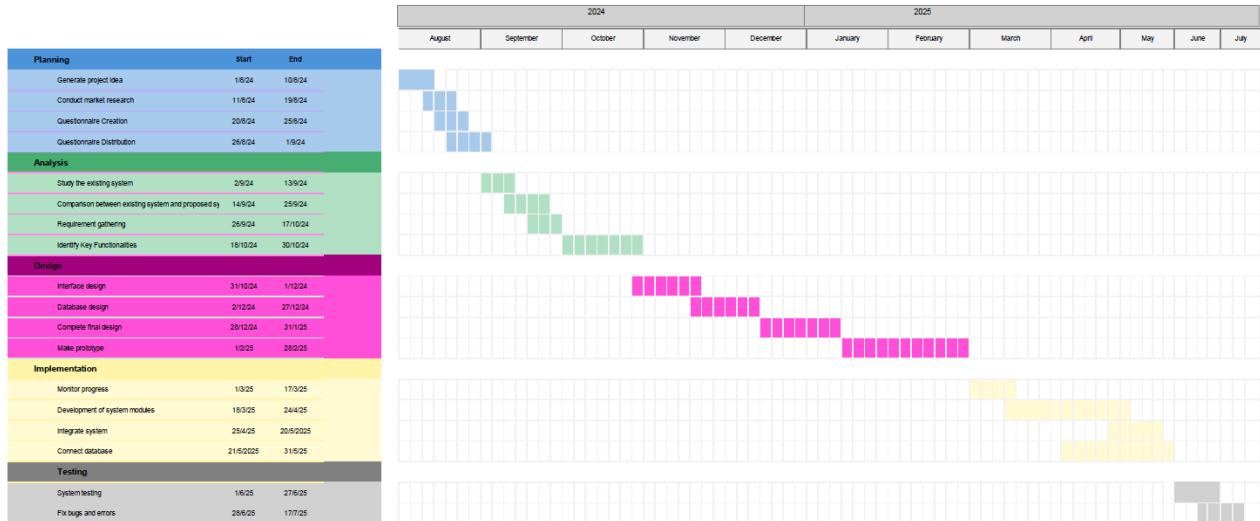


Fig.12 Gantt Chart of Project Progress for Online Cooperative Management System for SMK Muadzam Shah

Appendix B: Flowchart (End-User: Parent)

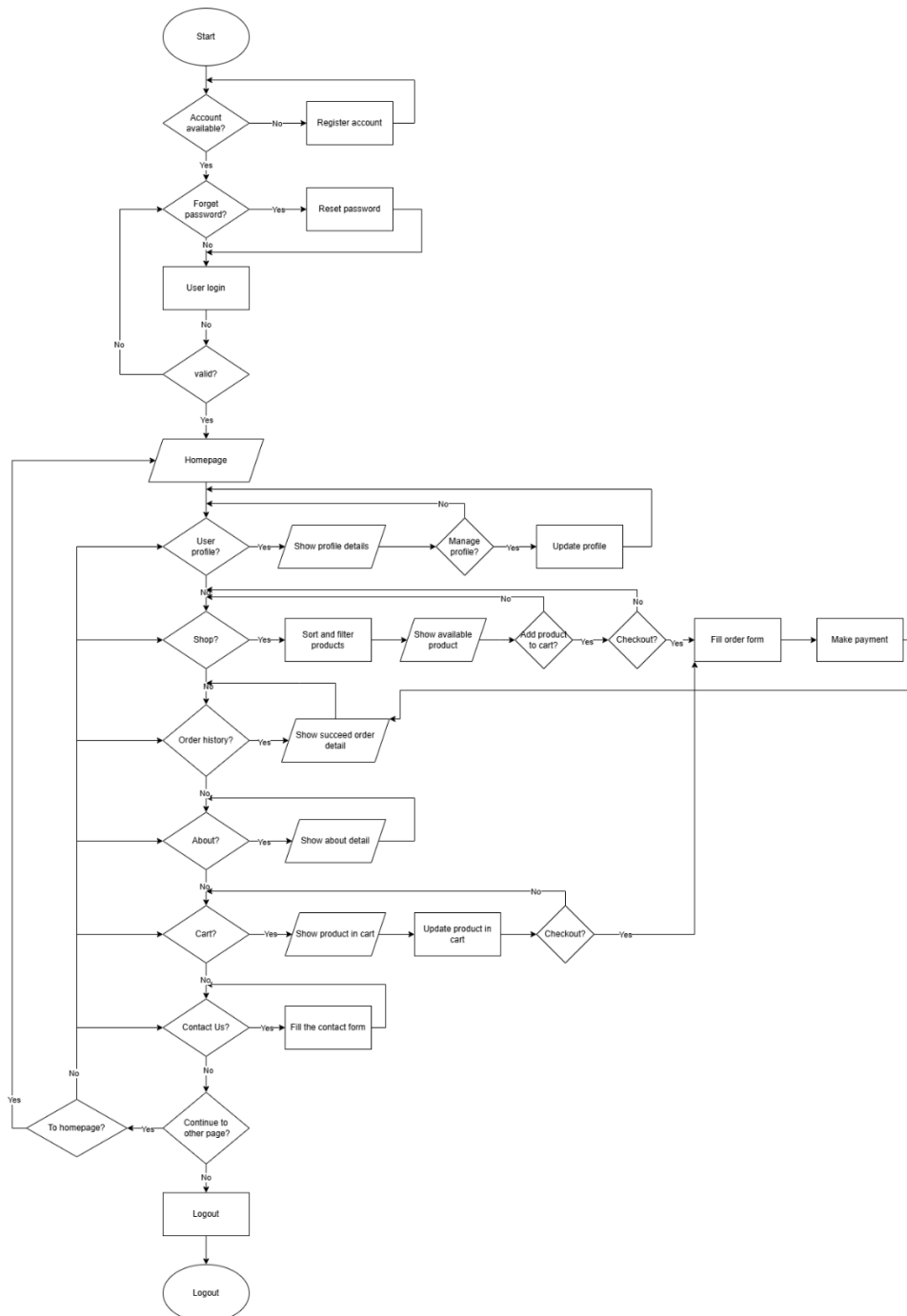


Fig.13 Flowchart of the End-User (Parent) Online Cooperative Management System for SMK Muadzam Shah

Appendix C: Data Flow Diagram Level-0

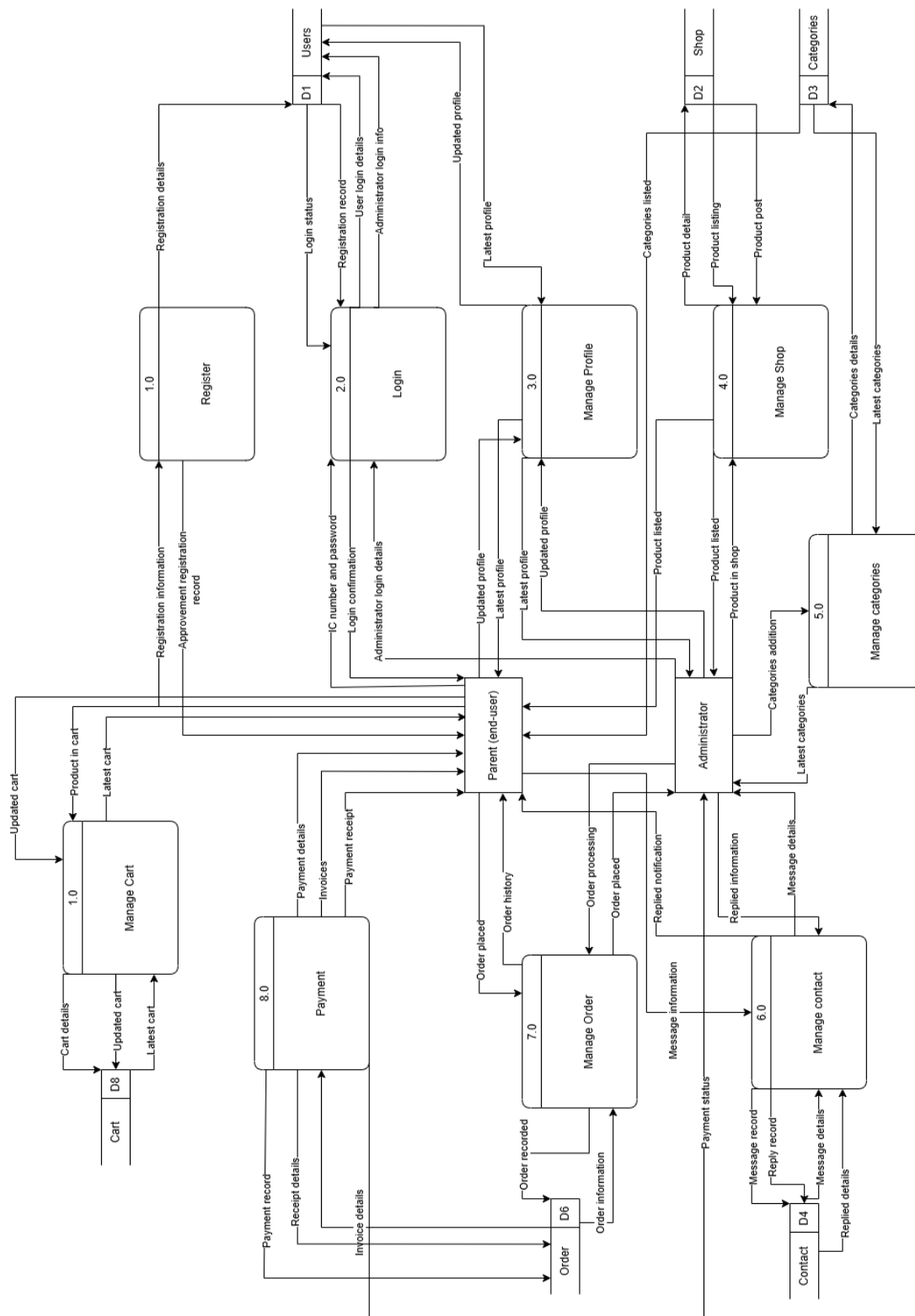


Fig.14 Data Flow Diagram of the system process Online Cooperative Management System for SMK Muadzam Shah

Appendix D: Entity Relationship Diagram (ERD)

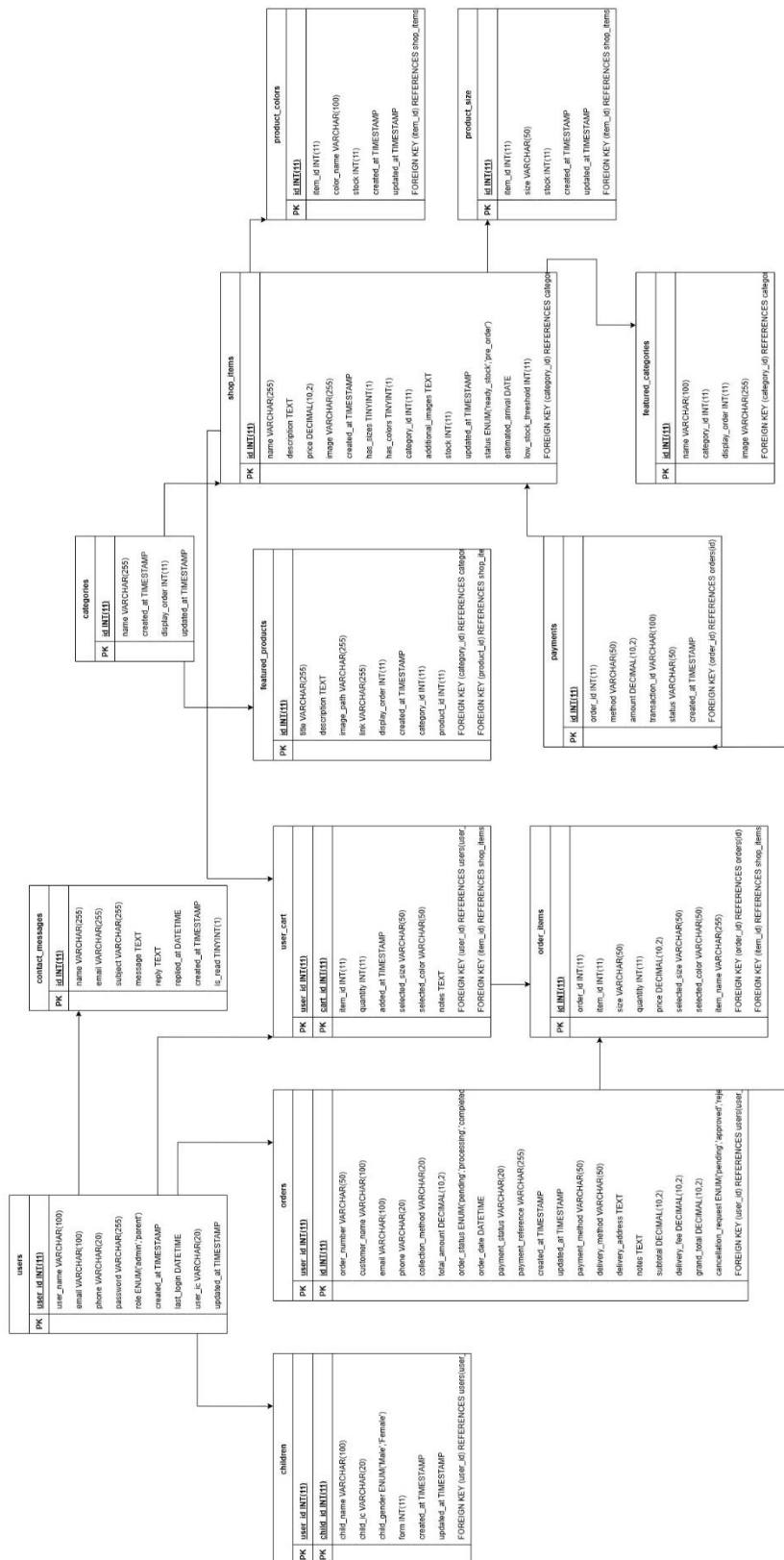


Fig.15 Entity Relationship Diagram (ERD) for Online Cooperative Management System for SMK Muadzam Shah