
Design And Construction Of A Web-Based Batak Cultural Product Sales Information System Using The Laravel Framework And Filament Admin

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Abstract

PT. Galeri Ulos Sianipar is a micro, small, and medium enterprise (MSME) engaged in the sale of traditional Batak craft products such as ulos, bags, wallets, and accessories. Previously, conventional transaction and data management processes triggered obstacles such as the risk of data recording errors, reporting delays, and limited marketing reach. This study aims to design and build an integrated web-based Batak cultural sales information system using the Laravel 12 Framework, Filament Admin Panel, and a MySQL database. The system development applies the Waterfall method consisting of the stages of needs analysis, system design, implementation, testing, and maintenance. The results of this study are an e-commerce application that integrates digital catalog features, product management, shopping cart management, checkout processes, digital payment verification (QRIS/Bank Transfer), and real-time financial reports. The implementation of this system has succeeded in simplifying customer access, accelerating the sales administration process, and expanding the reach of digital cultural product promotion.

Keywords: Sales Information System, Laravel, Filament, Waterfall, Batak Culture, MySQL.

INTRODUCTION

Current advances in information and communication technology have brought significant changes to various areas of life, including trade and cultural preservation. Utilizing web-based technology is an effective solution to help businesses market their products more widely, quickly, and efficiently. Through web-based information systems, data management, transactions, and information delivery to customers can be integrated, improving service quality and business competitiveness.

One sector with significant potential for development through the use of information technology is the sale of cultural products, particularly Batak cultural products. PT. Galeri Ulos Sianipar is a business entity specializing in the sale of various Batak cultural products, such as ulos, bags, wallets, hats, and various other handicrafts. These products possess high cultural and aesthetic value, requiring the support of digital-based promotional and marketing media that can reach a wide audience.

Based on field observations and interviews, sales transactions at PT. Galeri Ulos Sianipar are still conducted manually or using an unintegrated application. Customers must come directly to the gallery to view products and make purchases. Meanwhile, recording product data, inventory, sales transactions, payments, and financial reporting are still handled separately. This situation has the potential to lead to recording errors, delays in reporting, and inconsistencies in stock data.

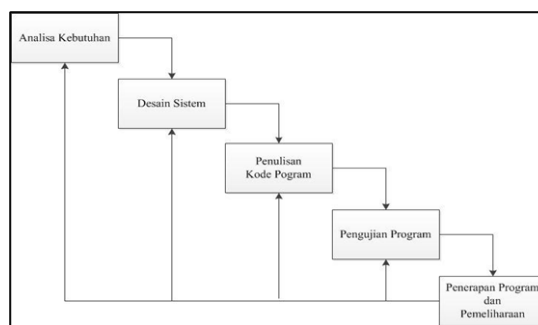
To address these issues, an integrated web-based Sales Information System is required. This system was developed using the Laravel Framework with Filament as the administration panel and MySQL as the database. The software development method used is the Waterfall approach, as it has systematic and structured stages. With the implementation of this web-based system, it is hoped that PT Galeri Ulos Sianipar's business operations will be more effective, efficient, and transparent.

RESEARCH METHODS

The system development method used in this research is the Waterfall (Linear Sequential Model) model. The stages of the Waterfall method are presented sequentially, from requirements analysis to system maintenance.

This software engineering application is broken down into five interconnected linear stages, as

visualized in the following cycle chart:



Picture 1. Stages of the Waterfall Software Development Method

The Waterfall model in Figure 1 provides a sequential methodological foundation for ensuring software quality. The Requirements Analysis phase focuses on extracting system specifications through interviews and observations. The System Design phase builds the application architecture using UML diagrams and database modeling. Next, the Program Coding phase translates the design blueprint into PHP based on Laravel and Filament. The Program Testing phase evaluates system functionality using Blackbox testing, and then proceeds to the Maintenance phase to address post-implementation performance optimization.

Data collection

Data collection techniques were carried out through direct observation at the PT. Galeri Ulos Sianipar location in Medan, in-depth interviews with management and cashiers, and literature studies to obtain supporting theories regarding information systems, software engineering, and Batak culture.

Waterfall Development Stages

1. Requirements Analysis: Identifying constraints on the running system and determining functional requirements for Admins and Customers.
2. System Design: Designing software modeling using UML (Use Case Diagram, Activity Diagram, Class Diagram) and designing RDBMS database schemas and interfaces (UI).
3. Implementation: Implementing the design results into the PHP 8.3 programming language with the Laravel 12 Framework, Filament Admin Panel, and MySQL.
4. Testing: Testing the validity of system functionality using the Blackbox Testing method to ensure each module runs according to specifications.

Maintenance: Conducting system evaluations and adjustments to maintain data stability and security.

RESULTS AND DISCUSSION

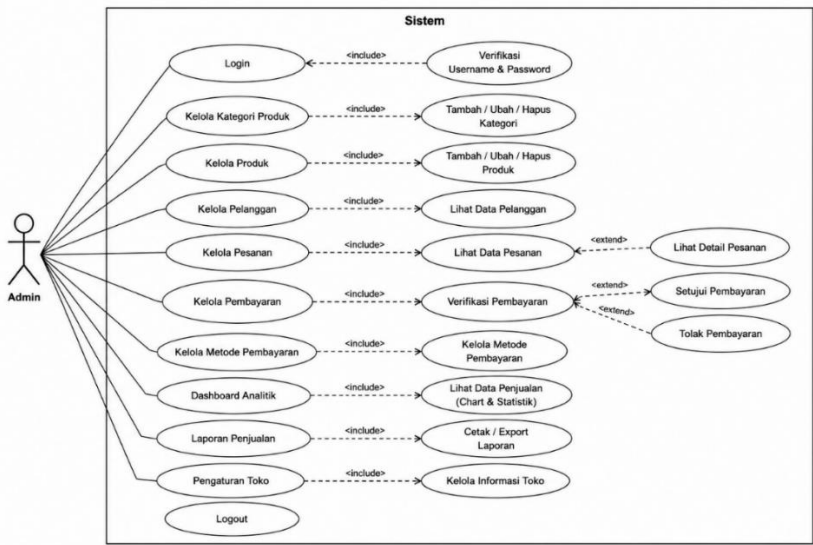
System Requirements Analysis

The developed sales information system divides access rights into two main user groups: Administrators and Customers. Administrators are responsible for managing product master data, categories, customer data, orders, payment verification, financial transaction recording, and daily and monthly reports. Customers, meanwhile, have the right to access the product catalog, place orders, upload proof of transfer/QRIS, and track order status in real time.

System Design with UML

System functionality modeling is described through Use Case Diagrams to clarify the boundaries of actor interaction with application features.

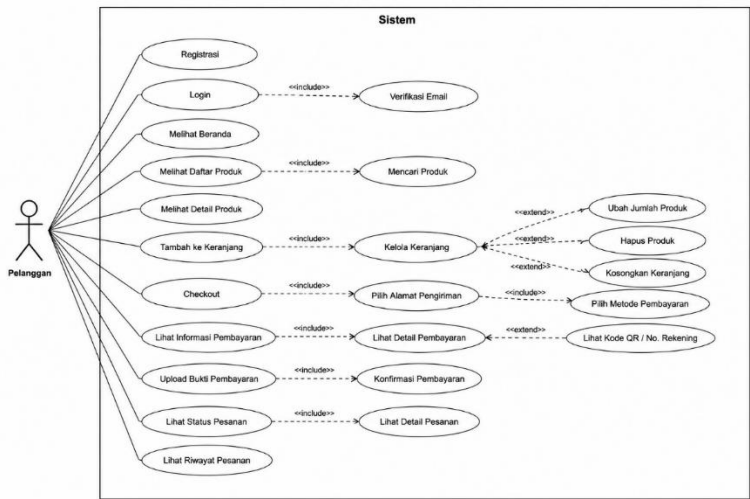
Mapping of access rights and scope of managerial authority for the Administrator actor can be seen in the UML diagram below.



Picture 2.Use Case Diagram Administrator

Based on the usage architecture mapped in Figure 2, the Administrator actor has full authorization over the backend system. This authority includes account authentication, master data manipulation (product categories and catalogs), verification of customer payment transaction receipts, control of order delivery status changes, and printing of periodic sales summary reports.

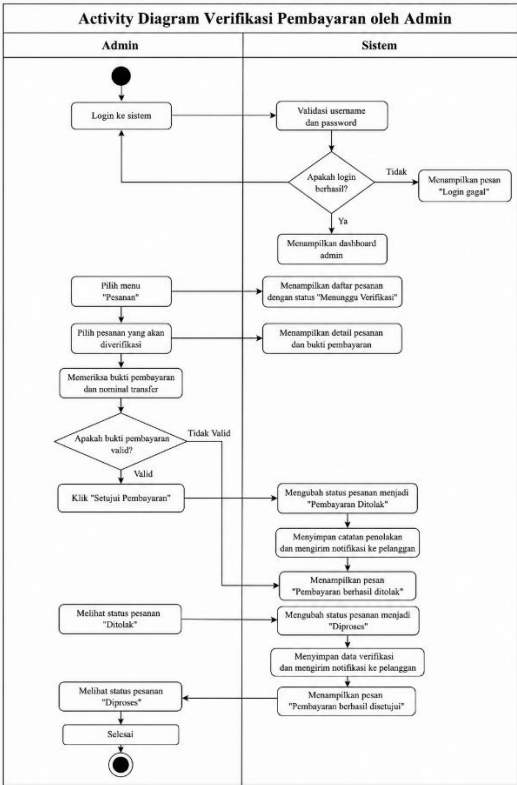
On the general user side, the abstraction of the interaction flow that facilitates customer operational activities is shown through the following diagram configuration:



Picture 3.Customer Use Case Diagram

The shopping functionality shown in Figure 3 facilitates customers' browsing the digital catalog, filtering items by category, and operating the shopping cart. Customers are also given access to perform automatic calculations on the checkout page, select bank or QRIS payment methods, and upload proof of transaction as a prerequisite for order processing.

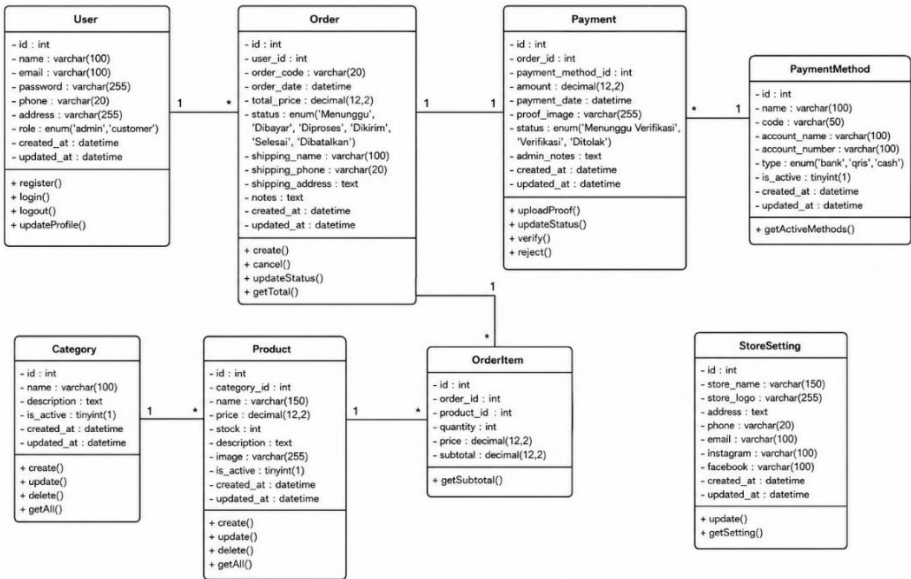
The system workflow when responding to the consumer's action of uploading proof of transaction is recorded in the following Activity Diagram scenario:



Picture 4. Activity Diagram of Payment Verification by Admin

The verification activity flow in Figure 4 emphasizes the strict transaction quality control mechanism. When proof of transfer is received, the Administrator validates the amount and destination account number. Admin approval automatically changes the transaction status to "Processing" and adds the incoming cash amount in real time. Conversely, a transaction rejection reverts the order status and triggers a warning notification to the customer.

To illustrate the structural relationship between objects and data schemas in the system, the formation of class relationships is depicted as follows:



Picture 5. Class Diagram of Batak Culture Sales Information System

The relationship pattern between entities in Figure 5 demonstrates a structured implementation of object-oriented programming. One-to-many cardinality connects the User entity with Order, Category with Product, and Order with OrderItem. Meanwhile, a one-to-one relationship is mapped

between Order and Payment to maintain referential integrity and prevent duplication of financial transaction data.

Database Design and Implementation

The design of an efficient and normalized data structure is implemented in the MySQL DBMS. Table 1 lists the attribute structure used to manage the product repository:

Table 1. Product Database Attribute Specifications

No	Field	Data Type	Information
1	id_product	BIGINT (PK)	Unique identifier of product entity
2	category_id	BIGINT (FK)	Entity relationship to categories table
3	name	VARCHAR(255)	Name of Batak craft product
4	slug	VARCHAR(255)	Unique URL in SEO-friendly format
5	price	INT	Nominal value of product selling price (Rp)
6	stock	INT	Quantity of inventory availability of goods
7	description	TEXT	Detailed description & product philosophy values
8	image	VARCHAR(255)	Product image file directory path
9	status	ENUM	Item availability (active/inactive)

The data field structure in Table 1 ensures consistent storage of commodity identities such as Ulos, Bags, and Accessories. The category_id field as a foreign key facilitates dynamic product grouping queries in the front-end catalog interface.

Meanwhile, to record the customer's shopping transaction history and shipping address, the database schema is set up referring to the following specifications:

Table 2. Order Database Attribute Specification

No	Field	Data Type	Information
1	id_order	BIGINT (PK)	Unique identifier of the order entity
2	user_id	BIGINT (FK)	Entity relationship to the users table (Customers)
3	invoice_number	VARCHAR(255)	Unique transaction invoice number
4	total_amount	INT	Cumulative total value of shopping bill
5	shipping_address	TEXT	Detailed address of the destination for delivery of goods
6	status	ENUM	Order stages (pending, paid, processed, etc.)

The attributes outlined in Table 2 serve as the primary repository for sales transactions. Status changes recorded in the status column automatically occur as the administrator performs verification steps.

System Interface Implementation (User Interface)

The implementation of the physical design of the interface is designed to be responsive to provide an optimal user experience on various devices.

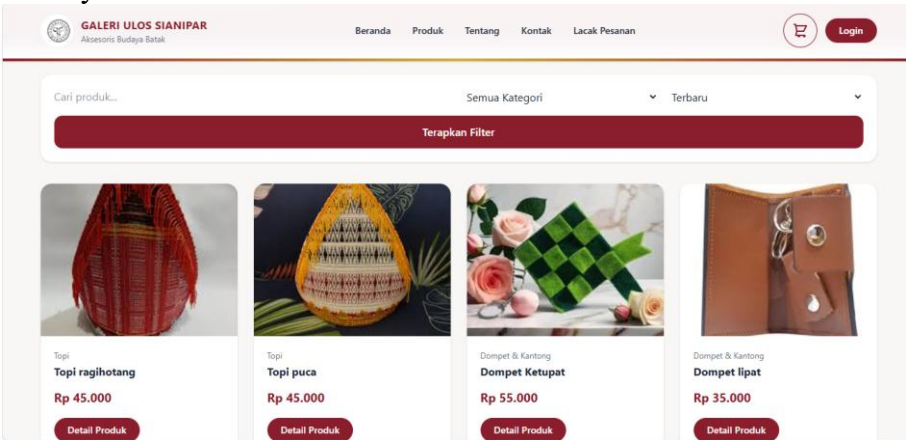
The visual layout design for the public homepage accessed by potential buyers is shown in the following layout:



Picture 6. Homepage View of PT. Galeri Ulos Sianipar Website

The homepage in Figure 6 blends the visual identity of Batak culture with modern e-commerce architecture. This interface integrates a main navigation menu, dynamic promotional banners, and a list of popular products for easy user accessibility.

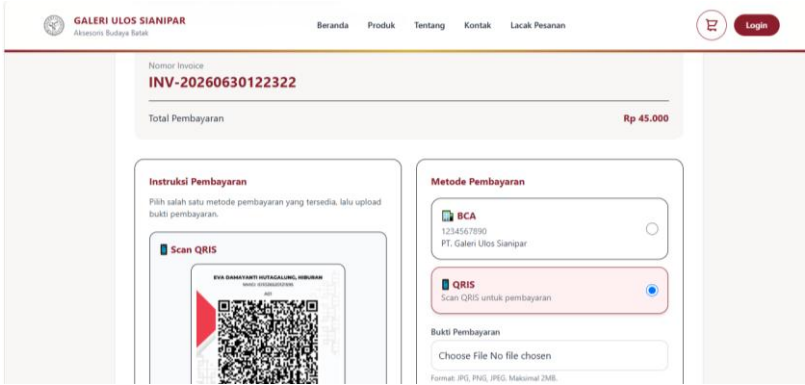
The comprehensive specification display when the user selects a product item is presented in the following interface layout:



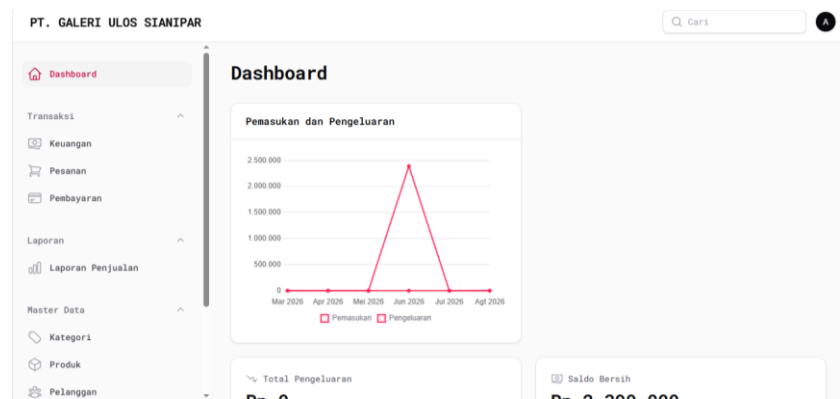
Picture 7. Product Detail Page View

The interface layout in Figure 7 contains an in-depth description of the technical specifications and philosophical background of the selected ulos fabric. Users can set the purchase quantity and directly press the "add to cart" button.

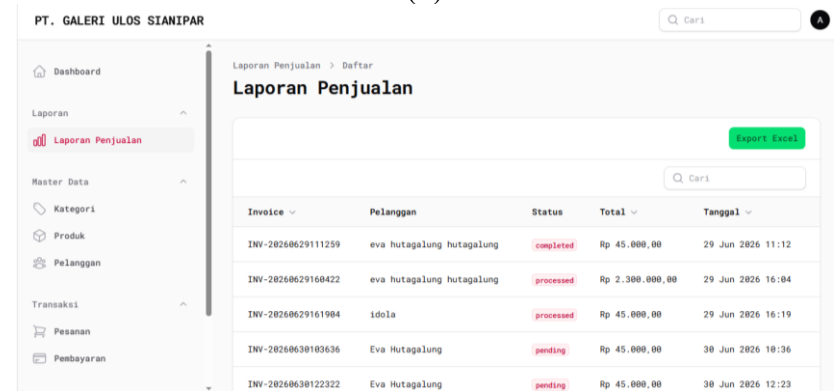
To provide a comprehensive overview of interface interactions from the consumer to the store manager's perspective, the system's core features—including digital payment confirmation, administrator control panel, and financial report recapitulation—are presented in an integrated manner in Table 3 below:



(a)



(b)



(c)

Table 3. Main Feature Interface Series of Batak Culture Sales Information System

The interface series presented in Table 3 represents an integrated operational flow from downstream to upstream transactions. In Sub-Figure (a), the payment confirmation interface facilitates non-cash transactions via bank transfers and QRIS code scanning, complete with extensometric validation of proof of transfer files. Furthermore, in Sub-Figure (b), the Filament Admin-based control panel presents a centralized analytics dashboard that displays a real-time summary of financial metrics, daily cash flow trends, and order verification queues. All transaction activity is automatically summarized in Sub-Figure (c), which provides a sales reporting module with dynamic date filtering and a document export facility to Microsoft Excel for store accounting audits.

System Testing (Blackbox Testing)

Application functionality evaluation is performed using the Blackbox Testing sample method. This testing is designed to ensure compliance between input and output for each software feature.

Table 4. Functionality Testing Evaluation Results Matrix (Blackbox Testing)

No	Test Scenario	System Response Expectations	Observation Results	Evaluation
1	Admin Authentication	Validate email/password credentials and open dashboard	As Expected	Valid
2	Product Management	Processing product data registration, update and deletion operations	As Expected	Valid
3	Checkout Transaction	Processing cart items into new order invoices	As Expected	Valid
4	Upload Proof of Payment	Save proof of transfer file and change verification status	As Expected	Valid
5	Payment Verification	Change order status to processed & update cash	As Expected	Valid
6	Export Report	Generating and downloading Excel format recapitulation files	As Expected	Valid

The test matrix in Table 3 confirms that all software functionality scenarios operate precisely without any logical constraints or program execution errors.

CONCLUSION

Based on the results of the analysis, design, implementation and testing that have been carried out, several main conclusions can be drawn as follows:

1. This research successfully designed and built a Web-Based Batak Culture Sales Information System at PT. Galeri Ulos Sianipar utilizing the Laravel 12 Framework, Filament Admin Panel, and MySQL database through the application of the Waterfall method.
2. The system is built centrally integrated to manage master data of products, categories, customers, order transactions, digital payment verification (QRIS/Bank Transfer), as well as daily/monthly sales report recapitulation.
3. The use of this information system can improve store operational efficiency, minimize the risk of errors in manual reporting, and make it easier for customers to make transactions and track order status online without geographical limitations.

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