

Fenix : A Fully Functional Shopping Mall Application

**D. I. De Silva, W. A. C. Pabasara, K. G. M. Prashantha, M. M. N. H. Fonseka,
S. M. Samaraweera, W. H. T. H. Perera**

*Department. of Computer Science and Software Engineering, Sri Lanka Institute of Information Technology,
Malabe, Sri Lanka*

Abstract:- Shopping has become an integral aspect of contemporary life, yet individuals often face challenges due to time constraints and inefficiencies in the traditional shopping experience. This study addresses common shopping difficulties, such as the lack of real-time information on item availability, the risk of forgetting planned purchases, and the inability to easily compare prices across different stores. The proposed solution is the Fenix shopping mall application, a fully functional platform designed to streamline the shopping experience. Developed through a comprehensive methodology, Fenix is a web application hosted on an application server with a centralized database and a server module connecting all customers and shops. It addresses these challenges by providing detailed information about all the shops within a mall, available items, latest deals, and facilitating the creation of customer wish lists. The study successfully integrates features like lost and found, loyalty management, fair pricing mechanisms, and geolocation-based real-time notifications to enrich the overall shopping journey. This abstract outlines the significance of the shopping mall application in overcoming common shopping challenges, offering users with a convenient and efficient shopping experience. The study's methodology involves the integration of cutting-edge technology, including web services, to ensure reliable and up-to-date information. The results indicate that Fenix has the potential to bridge the gap between traditional and online shopping, influencing consumer behavior and contributing to the advancement of the retail sector.

Keywords: *shopping mall, lost and found, loyalty management, latest deals.*

1. Introduction

Fenix is a cutting-edge solution developed to assist mall visitors throughout their shopping experience. This application empowers customers to effortlessly locate shops within the mall, explore available items and products, stay informed about promotions and events, all without the need to physically visit the shopping center. As suggested in [1], Fenix allows its users to create wish lists featuring their favorite items, receiving notifications about the latest prices and deals related to their selections.

This research aims to address challenges faced by various stakeholders during the shopping process. Customers often struggle to navigate malls, risking dissatisfaction and potential losses. Forgetting intended purchases and missing out on optimal prices and discounts are common issues. In the unfortunate event of losing personal belongings, chances of recovery are minimal. From the perspective of shop owners, a lack of centralized systems hampers their ability to effectively advertise shops, manage products and promotions, and handle administrative tasks, ultimately impacting sales and visibility.

Fenix endeavors to tackle these challenges by reshaping consumer behavior and bridging the gap between online and offline shopping. Hosted on an application server with a centralized database and a server module connecting customers and shops, Fenix is a web application designed to achieve the following objectives:

- Find the best deals, manage loyalty, and compare prices: Customers can identify items with the best prices and deals, compare products, and earn points based on their purchases for future discounts.

- Receive product collection and event notifications: Users gain information about shops, product catalogs, and availability, receiving notifications about the latest prices, product collections, and entertainment events in the mall.
- Manage shop and product details: Shop owners and administrators can utilize the web application to handle shop and product details, including rental payments.
- Assist in locating lost items: Visitors can report lost belongings within the mall through Fenix, enabling other users to assist in locating those items.

Subsequent sections of this research paper will delve into the literature review, detailing similar work, followed by the methodology section outlining how the research was conducted. The results and conclusion section will present the aftermath of the project and its final findings.

2. Literature Review

In recent years, the integration of technology into various aspects of everyday life has significantly influenced how businesses operate and engage with their customers. One area where technological advancements have been particularly evident is in the management of shopping malls and customer experiences through web applications. The literature review of the study centered on exploring features within shopping mall web applications, including lost and found, loyalty management, gift cards, listing product collections, and event notifications. Table 1 presents a comparison between the proposed web application and some existing applications such as Colombo City Center [2], Majestic City [3], Kandy City Center [4], and Jewel Shopping Mall [5].

TABLE I. COMPARISON OF EXSISTING APPLICATIONS AND FINIX CITY CENTER

Feature	Fenix	Colombo city center	Majestic city	Kandy city center	Jewel Shopping Mall
Lost and found	Yes	No	No	No	No
Loyalty management and gift cards	Yes	Yes	No	No	Yes
Shop owner administration	Yes	Yes	Yes	Yes	Yes
Event notifications	Yes	Yes	Yes	No	Yes

A. Lost and Found Feature

The concept of lost and found feature in a web application aligns with the growing emphasis on enhancing customer services and experiences in public spaces. While there is limited literature specifically addressing this feature in shopping malls, similar systems have been implemented in transportation hubs and public spaces. For instance, airports and public transportation systems have adopted Lost & Found applications to facilitate the reporting and claiming of lost items. These systems emphasize user-friendly interfaces, photo attachments, and notifications to relevant personnel. The proposed system's approach of involving mall staff and enabling users to provide detailed descriptions and photos aligns with these existing solutions [6].

B. Loyalty Management and Gift cards

Loyalty management and gift card functionalities have become integral to modern shopping experiences. Loyalty programs have been widely studied in the retail sector, with research highlighting their impact on customer retention and engagement. The web application's concept of loyalty cards encourages repeat purchases and customer loyalty. Existing literature explains the significance of seamless integration between physical and digital shopping experiences to maximize the effectiveness of loyalty programs [7].

C. Event Notifications and Listing Product Collection

Web applications have emerged as essential tools for spreading information about events, promotions, and entertainment in shopping centers. Existing web applications for shopping centers offer features such as store directories, event calendars, and real-time notifications. These functions enhance the overall shopping experience and contribute to customer satisfaction. Research also highlights the importance of personalized notifications and targeted marketing to increase customer engagement with app content [8].

D. Shop Owner Administration

Research in shop owner administration has centered on web-based management systems, investigating the utility of web-based tools for shop owners and emphasizing the importance of streamlined processes like rental payments and inventory control. Previous solutions offer valuable insights into creating an efficient and user-friendly admin portal within the web application [9].

In conclusion, the proposed web application features for lost & found, loyalty management, gift cards, and event notifications draw upon established practices and trends in the retail and technology sectors. While there is limited direct literature on all these features within a single shopping mall context, the underlying principles and benefits have been extensively explored in related domains. The integration of these features into a comprehensive shopping mall web application has the potential to enhance customer experiences, increase engagement, and contribute to the overall success of shopping centers.

3. Methodology

The Fenix shopping mall system comprises two essential components: a website and a shopping mall management system. These parts collaborate to assist shopping mall staff (managers, security officers), shoppers, and shop owners. Fig. 1 illustrates the interaction among these three end users. To ensure the reliability of information, the system utilizes web services, akin to constructing a sturdy structure with robust materials.

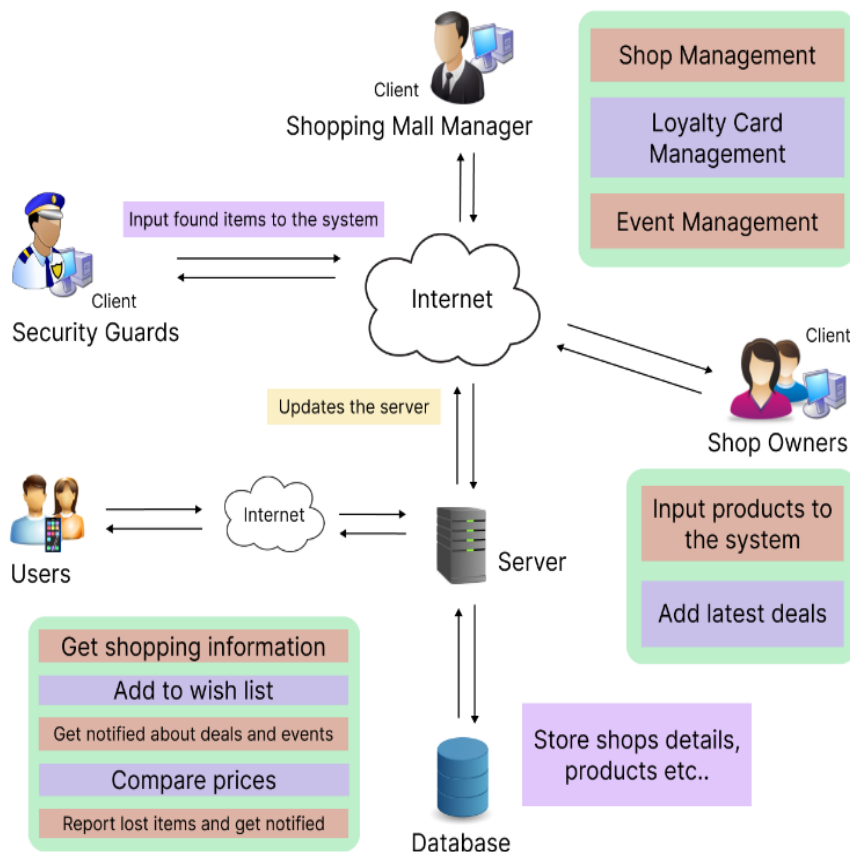


Fig. 1. System Diagram

A. Shopping Mall Management System

At the core of the Fenix shopping mall system, the shopping mall management system takes precedence, catering exclusively to shopping mall managers and shop owners. This specialized component features a comprehensive administrative interface powered by PHP with the Laravel framework [10] [11], ensuring robust server-side capabilities. The alignment of these technologies with a MySQL database [12] guarantees efficient data management. On the client side, Laravel Blade [13] and selected UI libraries [14] blend to create an engaging user experience that is both functional and visually appealing.

Real-time updates are facilitated through the incorporation of WebSocket [15] [16] [17], enabling shopping mall managers and shop owners to stay informed about changing conditions. Effective communication is further endorsed by the integration of SMS gateways [18] and email systems, providing a streamlined means to convey critical information and announcements.

Crucially, security and access management are maintained through the provision of distinct user accounts, preserving data privacy while tailoring access to specific business needs. This emphasizes the commitment to empowering stakeholders.

The shopping mall management system efficiently inputs a substantial volume of data into the database and ensures the seamless execution of all create, read, update, delete (CRUD) operations with a focus on performance.

B. Website

The website of the Fenix shopping mall system serves as a digital gateway tailored to shoppers, offering a range of user-focused functionalities to enhance their shopping experience. Notably, the lost and found feature, illustrated in Fig. 2, is ingeniously integrated using PHP with Laravel on the server-side and Laravel Blade on the client side to cater to mall visitors in need of assistance. This feature streamlines the process of reporting lost items within the mall premises, facilitating their quick and efficient location and subsequent return to their owners.

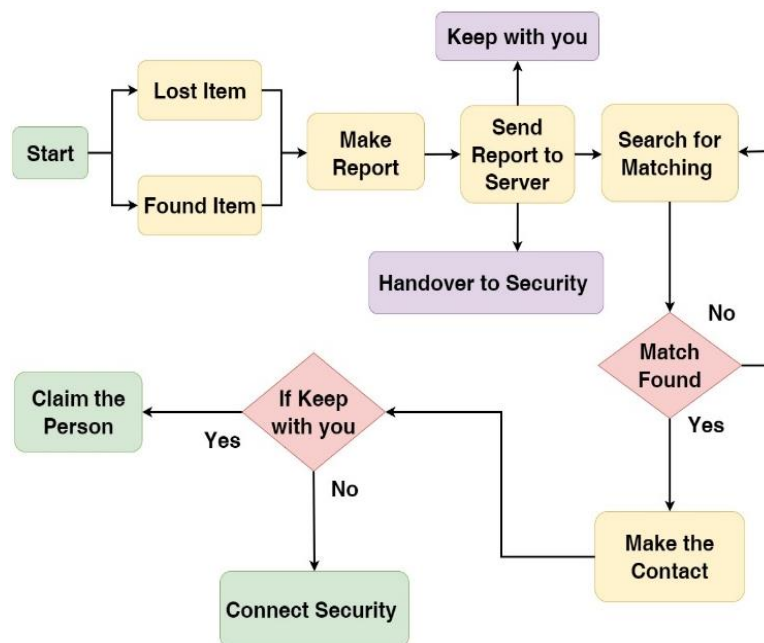


Fig. 2. The process of lost and found feature

With this feature, users can effortlessly notify the system about lost belongings, providing crucial details such as item descriptions, accompanying photos, the last known location (utilizing location tagging), and contact information. Once submitted, this information is swiftly relayed to mall staff and security personnel for prompt action. The lost and found page, a highlight of the website, offers all users a comprehensive view of lost items, complete with updates on their status as they are located and recovered. Users also have the ability to engage with

the system, responding to found item notices with pertinent descriptions, photographic evidence, and collection details.

Furthermore, the website prioritizes value for customers, seamlessly integrating loyalty management through PHP/Laravel, Blade, and the implementation of WebSockets. By utilizing the mobile app, customers accrue points tied to their purchases, later translated into coveted discounts and benefits. Moreover, these technologies enable customers to engage in price comparison, fostering an equitable and informed purchasing process.

The geolocation-based notification system sends notifications to users when they approach a shop in the shopping mall with new deals, offers, and promotions. Users need to grant location access to the system, and with a predefined proximity range of a shop, the system triggers a location event. This event is monitored by the application, which checks the shop's database for any recent deals, offers, or promotions. If new promotions are found, a real-time notification is sent to the user's device, informing them of the available discounts. To ensure privacy and user consent, clear opt-in mechanisms were implemented, allowing users to control whether they receive these notifications. This geolocation-based notification feature enhances the shopping experience by providing users with timely information about special offers as they navigate the mall, ultimately contributing to increased user engagement and satisfaction.

Furthermore, the website operates as an information hub, dynamically updating customers on the latest prices, product collections, favored items, and captivating events within the mall. Employing SMS gateways and email systems, shoppers remain informed and engaged, receiving vital notifications directly.

In conclusion, the website is a testament to the seamless integration of PHP/Laravel, Blade, WebSockets, SMS gateways, and email systems, expertly harnessed to enhance the shopping journey. Through the lost and found feature, loyalty management, fair pricing mechanisms, and real-time updates, the website encapsulates the spirit of Fenix shopping mall's commitment to an exceptional and enriched shopper's experience.

4. Results and discussion

The Fenix shopping mall application offers a centralized yet effective solution to prevailing shopping challenges. The lost and found feature simplifies the reporting and recovery of missing items, enhancing the customer experience by facilitating quick communication between customers and mall staff. The loyalty management system encourages repeat purchases, leading to increased consumer engagement and retention. Real-time updates ensure users have access to accurate and up-to-date information about products, events, and promotions, thereby enhancing their decision-making process. Shop owner administration provides business owners with an efficient platform for managing their stores and products, fostering increased efficiency and consumer engagement.

The successful integration of these elements into an unified platform bridges the gap between traditional and online purchasing. The Fenix application transforms the purchasing procedure within shopping malls into a simplified and personalized experience for both consumers and shop owners, offering real-time information, improved communication, and convenience. This integration exemplifies how contemporary technology has the potential to influence consumer behavior and boost the retail sector.

These findings underscore the practical usability and efficiency of combining multiple features into a single platform to address the diverse requirements of stakeholders in a shopping mall environment. The Fenix shopping mall application establishes a foundation for future endeavors to enhance the overall shopping experience through the use of technology and user-centered design.

5. Conclusion and future work

The development of the Fenix shopping mall system represents a significant advancement in improving the way consumers shop by bridging the gap between traditional and online retail spaces. The research study aimed to address various challenges faced by both shoppers and business owners in typical shopping malls. Fenix aspires to influence consumer behavior and enhance the overall shopping experience through the integration of cutting-edge technology and unique features.

As identified in the literature review, the integration of elements such as lost and found services, loyalty management, event notifications, and shop owner administration has proven its potential in various fields. While each of these elements has been developed independently, Fenix combines them into a single, comprehensive retail mall web application.

The lost and found feature, inspired by successful implementations in transit hubs and public locations, allows customers to conveniently report and reclaim lost items. Loyalty management and gift card features have been shown to increase customer retention and engagement, aligning with current purchase trends. Event notifications and product collection listings provide customers with relevant information, enhancing their shopping experience and satisfaction. Shop owner administration services expedite shop administration processes, benefiting both shop owners and customers.

The Fenix shopping mall system establishes the foundation for continuous enhancement and expansion. Future research in this field could include:

- User feedback: Gather feedback from mall visitors, shop owners, and mall staff to identify areas for improvement and optimize existing features. This iterative approach ensures that Fenix remains relevant to user requirements.
- Data analytics: Utilize Fenix data to gain insights into shopping trends, user preferences, and mall performance. This information can be employed for marketing approaches, product offerings, and tenant placement within the mall.
- Accessibility and inclusivity: Implement accessibility features and conduct usability testing to ensure that Fenix remains accessible to a wide range of customers, including those with disabilities.

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