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Design and Development of an HM Hotel Reservation System

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Abstract: This study presents the development of the HM Hotel Reservation System, designed to improve the reservation experience of users in the Hospitality Management (HM) Department of Madridejos Community College. The system addresses common issues found in traditional reservation systems, such as the absence of notification features, limited payment options, language barriers, and ineffective user interaction. To overcome these challenges, the upgraded system integrates essential features, including multilingual support, notification alerts, online payment via GCash, chat functionality, and guest feedback mechanisms, to enhance usability and the overall user experience. The study employed the Agile Software Development Model to ensure flexibility, continuous improvement, and active user involvement throughout the development process. The system was developed using a three-tier architecture consisting of presentation, application, and data layers to ensure efficiency, scalability, and reliability. Data were collected through observation of existing system limitations and feedback from students, instructors, and administrators who served as end-users of the system. The results revealed that the developed system significantly improved usability, operational efficiency, and user satisfaction. Based on the ISO 25010 software quality evaluation, the system obtained a mean score of 4.33 for functional suitability, 4.13 for performance efficiency, 4.16 for reliability, 4.33 for security, and 4.33 for compatibility, all interpreted as (Good). The overall average mean score of 4.25 (Good) further indicates that the system meets acceptable software quality standards and is suitable for regular use. The implementation of ISO/EIL 25010 software quality standards, including functional suitability, performance efficiency, compatibility, and reliability, contributed to the overall effectiveness of the system. Users were able to perform reservation tasks more easily and interact with the system in a more convenient and efficient manner. It is recommended for implementation in educational institutions, with future improvements focusing on mobile application development and advanced analytics features.

Keywords: Agile Development, Hospitality Management, Hotel Reservation System, Online Booking, User Experience, ISO/EIS 25010.

I. INTRODUCTION

A reservation system is a platform that allows customers to book services in advance while enabling organizations to manage availability, customer information, and operational resources efficiently. A reservation is commonly defined as a unilateral statement made by a state when signing or ratifying a treaty, modifying or excluding the legal effect of certain provisions (Chow, 2017) [1]. In the hospitality industry, hotel reservation systems are essential tools that support revenue generation, demand forecasting, and service planning. Accurate reservation forecasting helps hotel managers make informed operational decisions and improve service delivery (Wang & Duggasani, 2020) [2]. Reservation systems can be classified into traditional manual reservations, computerized systems, and modern online reservation platforms. Online systems provide convenient booking experiences through user-friendly interfaces and seamless navigation, which influence customer acceptance and usage of booking technologies (Morosan & DeFranco, 2016) [3]. The reservation process also serves as the first interaction between customers and hotels, shaping overall customer perception and experience (Lemon & Verhoef, 2016) [4]. Currently, reservation systems manage large volumes of booking and customer data that support data-driven decision-making and organizational efficiency (Ivanov & Webster, 2017) [5]. However, despite technological advancements, existing hotel reservation systems still show several limitations, including the absence of administrator notification alerts, limited payment options, lack of visible ratings and feedback mechanisms, language barriers, and reported dissatisfaction during the reservation process. These challenges reduce system efficiency and affect user experience [6]. To address these issues, this study proposes the development of the HM Hotel Reservation System, which integrates multilingual support, notification features, online payment options, chat functionality, and guest feedback mechanisms. The study examines system usability, notification capability, payment flexibility, and communication features as independent variables influencing user satisfaction and overall reservation experience. The expected outcome of the proposed system is an improved reservation process that enhances customer satisfaction, strengthens communication, and increases operational efficiency through a more accessible and user-centered hotel booking system [7].

II. OBJECTIVE OF THE STUDY

The purpose of this study is to develop an enhanced HM Hotel Reservation System (HMHRS) for the College of Hospitality Management that improves reservation management, user experience, and overall system quality. Specifically, the study aims to design a comprehensive dashboard that displays key information such as today's bookings, confirmed and cancelled reservations, checked-in and checked-out guests, room availability, accommodation details, total full payments, pending payments, and overall payment summaries. The system will incorporate Create, Read, Update, and Delete (CRUD) functionalities to efficiently manage data for both guest and administrator users, and include features to display and generate printable reservation records. Additional features will be added to improve usability and user experience, including multilingual support for guests, a notification bell for administrators, a chat box, room star-rating, and online payment capabilities. Furthermore, the system will be developed following the ISO 25010 software quality model, focusing on functional suitability, performance efficiency, compatibility, and reliability. Finally, the system aims to provide customers with a high level of usability, ensuring usefulness, satisfaction, ease of use, and ease of learning. Through these objectives, the study seeks to create a reservation system that is efficient, user-friendly, and aligned with modern hospitality management standards.

III. MATERIALS AND METHODS

A. *Research Design*

This study employed the Developmental Research (DR) methodology, which focuses on the structured design, creation, and evaluation of systems to ensure effectiveness, usability, and alignment with stakeholder needs (Richey & Klein, 2007) [8]. In addition, a descriptive analysis approach was used to visualize data via the system dashboard, providing a detailed overview of system functionality, performance, and user interactions, which improves comprehension and usability (Creswell & Creswell, 2018) [9].

The software was developed using the Agile Software Development Life Cycle (SDLC) Model, which emphasizes iterative and incremental development. Agile SDLC is widely recognized for promoting stakeholder engagement, flexibility, and timely delivery of working software (Highsmith, 2009) [10].

Agile Software Development Life Cycle Model

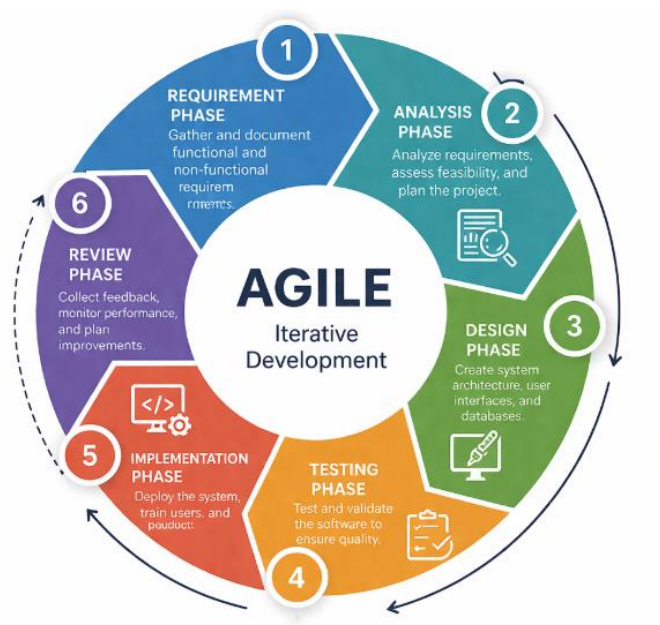


Figure 1. Agile Software Development Life Cycle Model

B. Agile Software Development Life Cycle Model

The Agile SDLC model used in this study consists of six iterative stages.

Phase 1. Requirement

Requirements were gathered through interviews, surveys, focus group discussions, and observations. Functional requirements included guest information, room management, Gmail integration, OTP verification, and payment processing via GCash. Non-functional requirements focused on web accessibility, performance, and scalability.

Phase 2. Analysis

1. The researchers conducted a detailed assessment of:
 - a. Data requirements: Reviewed forms, policies, and standards for accuracy.
 - b. UI/UX design: Developed responsive interfaces aligned with stakeholder preferences and WCAG accessibility guidelines.
 - c. Data security: Evaluated security algorithms to protect sensitive information.
 - d. Data management: Ensured the system was compatible with existing infrastructure.
 - e. Reporting: Identified key reports for the dashboard.
 - f. Documentation: Prepared clear and thorough manuals for system users.

Phase 3. Design

Wireframes and prototypes were developed for stakeholder review. The system architecture followed a client-server model with a scalable, secure, and responsive design. PHP and JavaScript were used for development, and Google Firebase was integrated for OTP authentication. Data analytics features such as bar graphs and pie charts were included for real-time dashboard reporting.

Phase 4. Testing

A survey questionnaire was developed and validated by experts to evaluate functionality, usability, reliability, portability, and maintainability. Reliability was confirmed using Cronbach's alpha, and technical experts tested system performance in real-world environments. Feedback was used to refine the system iteratively.

Phase 5. Implementation

The system was deployed gradually with training for administrators. The architecture included Front-End interfaces for guests and admins, a Back-End cloud server for data storage and processing, a Load Balancer for performance optimization, a Firewall for security, and Backup Storage for data integrity. GitHub was used for version control and collaborative development.

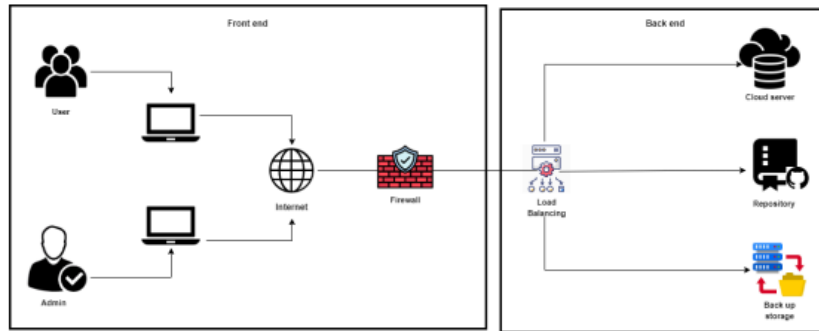


Figure 2. System Implementation

Phase 6. Review

System performance was monitored post-deployment, with continuous evaluation of all features. Training sessions ensured administrators and stakeholders could efficiently manage the system.

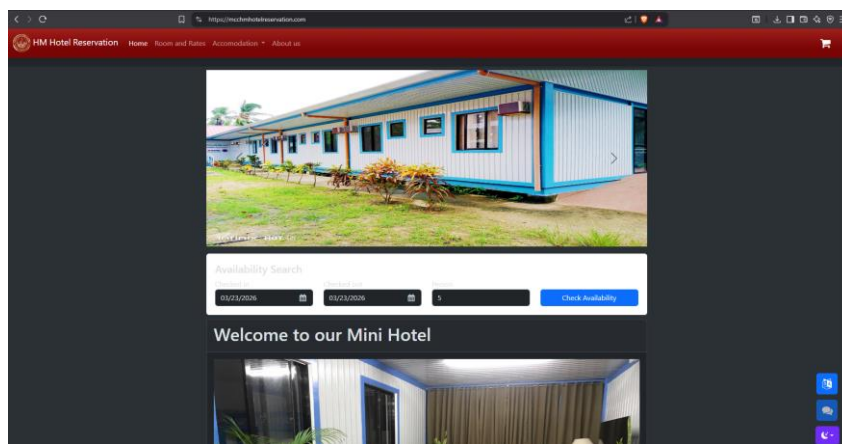


Figure 3. Shows Homepage

IV. RESULTS AND DISCUSSION

Overall, the HM Hotel Reservation System was evaluated as highly functional and effective based on feedback from IT experts and users. The system demonstrated strong performance in key areas such as dashboard display, CRUD operations, report generation, and additional features. Most components received ratings of Highly Functional (HF0 and Strongly Functional (SF), indicating that the system meets its intended purpose efficiently.

Furthermore, based on the ISO 25010 Software Quality Model, the system achieved an overall rating of “Good”, confirming that it meets acceptable standards in functionality, performance, security, and compatibility. In terms of usability, users agreed that the system is useful, easy to use, easy to learn, and satisfactory.

Table 1. In terms of displaying data into the dashboard

	Mean	VI
The system displays the dashboard number of bookings today, rooms, reservation.	4.66	HF
The system displays the dashboard number of confirmed bookings, cancelled bookings.	4.00	HF
The system displays the dashboard number of guests checked in, accommodation.	4.33	HF
The system displays the dashboard number of check out guests, overall total full payment, pending payment, overall total payment.	5.00	SF
TOTAL	4.60	HF

Table 1 presents the evaluation of the system’s dashboard features with an overall mean of 4.60 (Highly Functional). This indicates that the dashboard effectively displays important information such as bookings, reservations, and payments. While confirmed and cancelled bookings received the lowest score (4.00), all indicators remained within the highly functional level. The highest-rated feature (5.00) reflects excellent clarity and reliability in financial and checkout data.

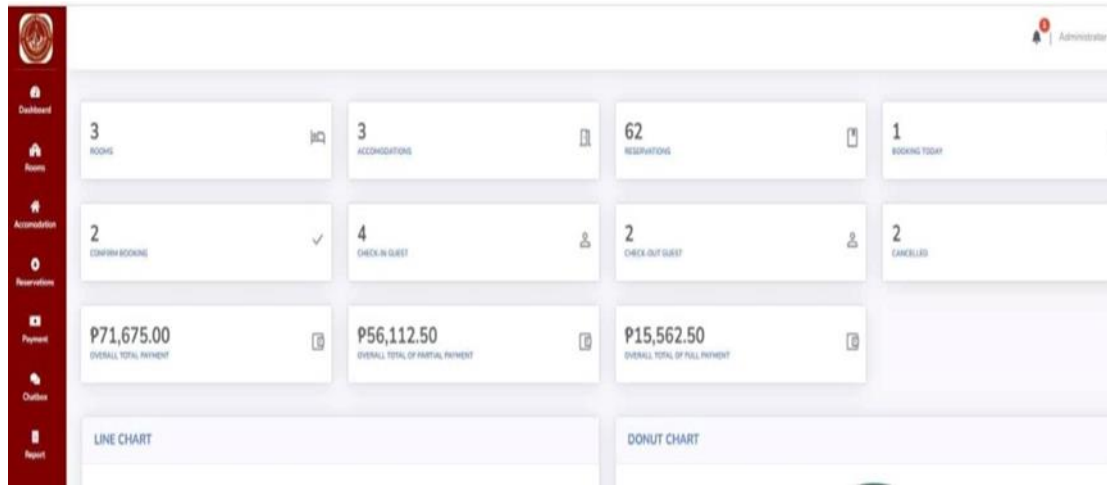


Figure 4. Shows Admin Dashboard

The section of the HM Hotel Reservation System that is shown on the dashboard allows the administrator to view the total number of bookings today, confirmed, and cancelled reservations, check-in and check-out guests, rooms, reservations, accommodations, total full payment, total pending payment, and total payment, as illustrated in Figure 4. This system feature makes it easier for the administrator to view the specifics of a guest's reservation.

Table 2. In terms of admin Creating, Reading, Updating, and Deleting (CRUD)

	Mean	VI
The system can create user accounts, update rooms, update user information.	4.66	HF
The system can read user information.	4.33	HF
The system can delete rooms, and accommodations.	5.00	SF
TOTAL	4.71	HF

Table 2 shows the system’s performance in terms of Create, Read, Update, and Delete (CRUD) functions, with an overall mean of 4.71 (Highly Functional). This demonstrates that the system efficiently manages administrative tasks. Reading user information received the lowest score (4.33), suggesting minor improvements in interface design, while deletion functions achieved a perfect score (5.00), indicating smooth and reliable performance.

Figure 5. Shows allowing users to create account

Figure 5 shows the Personal Details registration form of the HM Hotel Reservation System. The interface allows users to input their personal information required for account creation. It includes fields such as avatar upload, first name, last name, gender, date of birth, phone number, city, and address. Additional details such as zip code, nationality, company, company address, email, and password are also required. The form is organized into two columns for better readability and user convenience. This feature enables users to register efficiently and securely within the system.

Table 3. In terms of displaying and generating print guest reservation and switching languages, receiving notification bell, using chat box, room star rating, and making online payment

	Mean	VI
How functional is our system in terms of displaying print guests' reservation?	5.00	SF
How functional is our system in terms of generating print guests' reservations?	5.00	SF
The system's additional features, language options, notification bell, chat box, room star rating, and online payment.	5.00	SF
TOTAL	5.00	SF

Table 3 presents the evaluation of the system's functionality in displaying and generating printed guest reservations, as well as its additional features such as language options, notification alerts, chatbox, room star rating, and online payment. The system obtained a total mean score of 5.00, interpreted as Strongly Functional (SF).

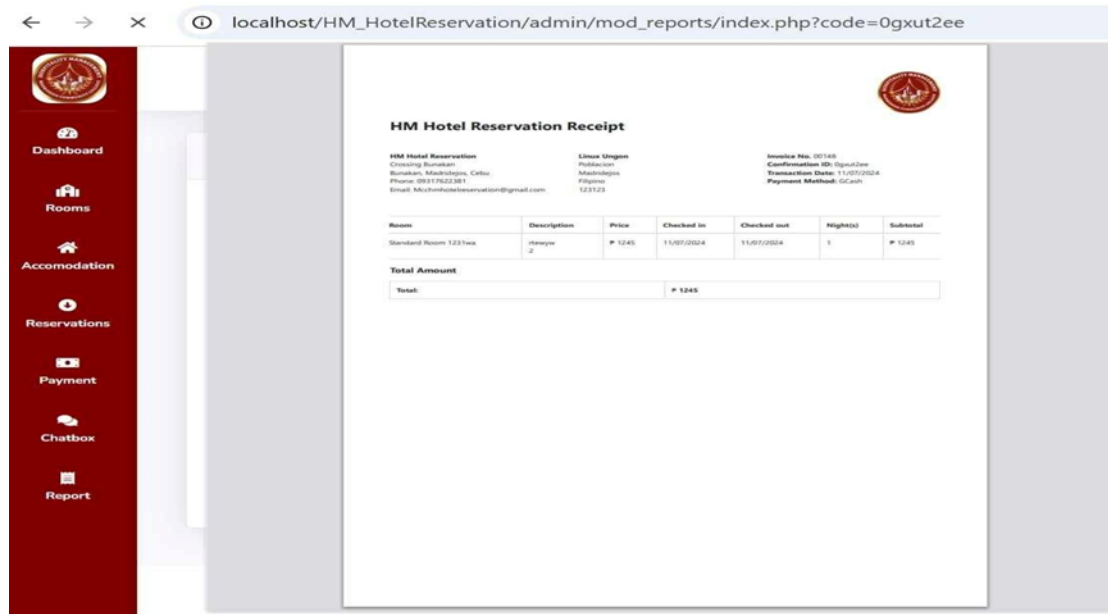


Figure 6. In terms of displaying print guest reservation

Figure 6 shows the HM Hotel Reservation System interface where the printed guest reservation receipt is displayed. The page presents detailed reservation information, including guest details, booking description, check-in and check-out dates, payment status, and total amount. This feature allows administrators to review and verify reservation records before printing, ensuring accuracy and proper documentation of transactions.

Table 4. In terms of the characteristics set in ISO 25010 Software Quality Model

Criteria	Mean	Verbal Interpretation
Functional Suitability	4.33	Good
Performance Efficiency	4.13	Good
Reliability	4.16	Good
Security	4.33	Good
Compatibility	4.33	Good
Average Mean Value	4.25	Good

Rating Scale: 5 - Very Good 4 - Good 3 - Average 2 - Fair 1 – Poor

Table 4 shows that the system achieved an overall rating of 4.25 (“Good”) based on ISO 25010. While performance efficiency scored the lowest, functional suitability, security, and compatibility received the highest ratings, indicating that the system is reliable, usable, and suitable for regular use.

Table 5. In terms of usefulness, Ease of use, Ease of Learning, and Satisfaction

Criteria	Mean	Verbal Interpretation
Usefulness	4.53	Agree
Ease of use	4.42	Agree
Ease of Learning	4.49	Agree
Satisfaction	4.49	Agree
Average Mean Value	4.47	Agree

Legend: 1 – Strongly Disagree 2 – Disagree 3 – Neither agree nor disagree 4 – Agree 5 – Strongly Agree

Table 5 shows an overall mean score of 4.47 (“Agree”), indicating that users generally find the system usable and satisfactory. Usefulness received the highest rating, while ease of use scored the lowest, suggesting minor improvements are needed to enhance user experience.

IV. CONCLUSION

This study utilized descriptive analysis to evaluate the effectiveness of the HM Hotel Reservation System. The developed system successfully presented essential operational data through an interactive dashboard, including the total number of daily bookings, room availability, reservations, confirmed and canceled bookings, checked-in and checked-out guests, accommodations, and payment summaries. The visualization of these data enabled administrators to efficiently monitor and manage reservation activities. Based on the evaluation results and expert feedback, the researchers conclude that the HM Hotel Reservation System is efficient, reliable, and user-friendly for managing hotel reservations. The web-based system demonstrated effectiveness in supporting reservation processes by providing secure, convenient, and fast transaction management for users. The integration of system features improved overall usability and enhanced the reservation experience. Findings revealed that the system satisfied respondents and successfully met the objectives of the study. Evaluation results confirmed compliance with the ISO/IEC 25010 software quality characteristics, particularly in terms of functional suitability, performance efficiency, compatibility, reliability, security, and user satisfaction. High evaluation scores indicated that users perceived the system as useful, easy to use, and effective for reservation management tasks. Furthermore, several system components achieved perfect evaluation scores, including dashboard financial monitoring, deletion functions for rooms and accommodations, reservation printing capabilities, and additional features such as multilingual options, notification alerts, chat functionality, room star ratings, and online payment integration. These features significantly contributed to improving system effectiveness and reliability for the Hospitality Management Department of Madrideojos Community College. Overall, the HM Hotel Reservation System provides an effective digital solution that enhances reservation management processes while supporting practical learning applications within hospitality education.

V. RECOMMENDATION

Based on the findings and evaluation results of the study, several improvements are recommended to further enhance the HM Hotel Reservation System: An Advanced Framework for Enhanced Reservation Management. First, the capability of displaying confirmed and canceled bookings may be improved by converting these dashboard elements into interactive buttons, as suggested by IT experts. This enhancement can allow administrators to quickly access detailed reservation information and improve system navigation efficiency. Second, the process of reading user information should be enhanced through improved user interface design. Refining layout organization, visual clarity, and data presentation can help administrators access user records more efficiently and reduce operational complexity. Third, system performance efficiency should be further optimized by minimizing processing time and improving resource utilization. Enhancements in database management, server response time, and system optimization techniques are recommended to ensure faster and more reliable performance. Finally, the overall ease of use of the system may be strengthened by developing a more user-friendly interface. Simplifying menus, improving navigation paths, and ensuring consistent design

elements can enhance usability and provide a smoother user experience for both administrators and guests. Implementing these recommendations will contribute to continuous system improvement, ensuring that the HM Hotel Reservation System remains efficient, reliable, and aligned with modern hospitality management and software quality standards.

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