

Development and Architecture of a GIS-Integrated Web Portal for Centralized Destination Booking

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ABSTRACT

The Municipality of Dasol in Pangasinan, known as the "Salt Capital" of the province, possesses rich tourism assets yet continues to operate under a largely manual and fragmented tourism management system. The Municipal Tourism Office relies on physical logbooks and informal communication channels to monitor tourist arrivals and coordinate accommodation bookings, resulting in information asymmetry, inventory perishability, and administrative inefficiencies. This study is proposed to address these systemic challenges. Using the Agile software development methodology, the study will identify existing tourism data collection and booking procedures, analyze gaps in the current system, determine the features to be integrated, and evaluate the acceptability of the proposed system. The platform will incorporate an interactive GIS map using Leaflet.js and OpenStreetMap, a centralized accommodation booking module, a tourism information portal, a monitoring dashboard for the Municipal Tourism Office, and a resort management interface for accommodation providers. The system will be developed using the Laravel PHP Framework, MySQL, and Visual Studio Code, and will be evaluated by respondents including tourists, resort owners, tourism officers, and IT experts using a four-point Likert Scale. The ISO/IEC 25010 standard is proposed as the framework for future evaluation across functional suitability, performance efficiency, usability, reliability, and portability. The proposed system aims to provide a secure, cloud-based alternative to the existing manual logbook system, providing real-time data, improving tourist experience, and supporting sustainable tourism management in Dasol, Pangasinan.

Keywords: Tourism Management, Cloud-Based System, GIS Mapping, Accommodation Booking, Agile Software Development

INTRODUCTION

Digital transformation has fundamentally reshaped how tourism destinations operate, compete, and deliver services to travelers. According to the ADB Brief (2024), digital integration is a foundational requirement for building long-term resilience in the hospitality sector, as travelers today expect instant access to accurate destination information and seamless booking transactions. In the Philippines, the rapid growth of web-based platforms has created both opportunities and pressures for local government units to modernize their tourism management systems [1].

The Municipality of Dasol in Pangasinan, known as the "Salt Capital" of the province, possesses significant tourism assets, including Tambobong Beach, its salt making heritage, and the scenic Malacapas View Deck. Despite these resources, Dasol's Municipal Tourism Office operates with a manual workflow that relies on physical logbooks and informal communication channels to monitor tourist arrivals and coordinate accommodation bookings [2]. The most critical structural challenge is the municipality's geographical configuration. The Municipal Hall is situated approximately 21 kilometers from the primary coastal hub of Tambobong Beach, requiring nearly an hour of travel over rugged and hilly terrain. Under the existing manual system, real time monitoring of tourist activity at these remote coastal sites is physically impractical.

This lack of centralized digital infrastructure creates a condition Harvey (2025) identifies as "information asymmetry," where resort owners possess critical room availability data that remains inaccessible to potential tourists until their physical arrival [3]. Tourists frequently endure the full hour-long journey only to find all accredited resorts fully booked. Smith and Thompson (2023) further note that manual booking systems in rural destinations create "administrative bottlenecks" that detract from actual guest service [5], while StayEase (2025) emphasizes that a Central Reservation System can automate inventory management and significantly reduce double bookings [4].

To address these challenges, this study presents the architectural design of VisitDasol which is a web-based, GIS-integrated tourism portal with centralized accommodation booking. The system is built on a three-tier software architecture and integrates geographic information system technology to provide spatial intelligence beyond what standard mapping applications offer. This paper discusses the system's architectural framework, the selection and integration of development technologies, and the results of the system's acceptability evaluation.

METHODOLOGY

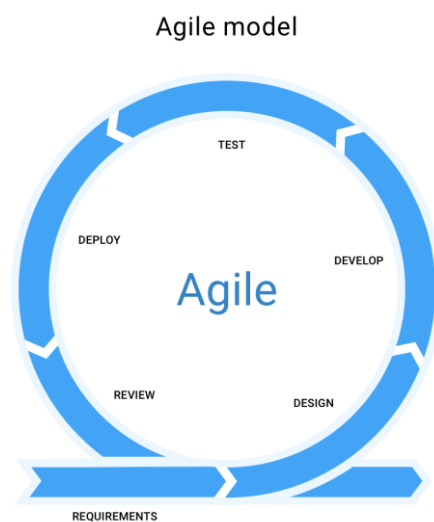


Figure 1. Agile Software Development Model

To ensure a structured and adaptable approach to addressing the fragmented tourism and booking operations in the municipality, the Agile software development methodology will be used as the research design in this study. Agile is an iterative and user-centric framework that prioritizes continuous feedback, collaborative planning, and rapid software deployments to integrate user requirements with technical capabilities [6]. Involving six core phases Requirements, Design, Development, Testing, Deployment, and Review it is highly effective for engineering solutions where system features must dynamically adapt to stakeholder feedback. Figure 1 shows the Agile Software Development Model.

The first phase will involve a deep understanding of the current operational ecosystem and user requirements. Designing a system architecture and structural framework that will suit the localized needs of the municipality's tourism landscape is the primary concern of this study. Interviews with the Municipal Tourism Office administrators and local resort owners will help the researchers understand the manual registration and reservation processes currently implemented. Forms and other related documents, such as physical guest logbooks, manual reservation slips, and tourism arrival reports, will be collected to identify important data attributes needed in the unified tourism platform.

From the data collected, the researchers will begin to define and analyze the underlying structural gaps of the existing workflow. Issues and challenges, such as double-booking errors, information asymmetry, and manual data transcription delays, will be listed and carefully analyzed. In addition, the researchers will identify the

diverse target user groups of the web portal, segmenting them into tourists, accommodation providers, and municipal administrators. The varying operational rules of local resorts, registration protocols for visitors, and inventory tracking procedures of the Municipal Tourism Office will also be systematically mapped in this phase.

The researchers will then begin designing solutions based on the requirements and constraints identified in the early phases. The design phase will allow the researchers to transition the traditional, paper-based workflow into a proposed online-based architecture for reservation handling and destination mapping. Spatial visualization approaches using geographic information data and real-time inventory management loops for handling booking requests will be conceptualized in this phase to prevent the expiration of unallocated accommodation slots.

To conceptualize the data flow and system behavior of the proposed portal for the VisitDasol platform, different engineering diagrams will be utilized. In the structural design, the researchers will identify the system entities and data relationships involved in the transactional process. Components of the five core modules the interactive GIS map, centralized booking engine, information portal, Municipal Tourism Office dashboard, and resort interface will be listed alongside their explicit functions in the system. An architectural framework will be used to depict the internal structure of the platform, utilizing a three-tier architecture comprising a presentation layer, application layer, and spatial data layer. These design specifications will serve as the blueprint for the prototype construction of the proposed web portal.

Interaction with the target stakeholders is paramount in the testing and evaluation phase. Once all identified functional modules, database schemas, and architectural frameworks have been built, the researchers will present the working system to tourists, resort operators, tourism officers, and IT experts for rigorous testing and review [9]. The respondents will carefully analyze the deployment, user interface responsiveness, and spatial accuracy of the proposed solutions to evaluate whether the integrated system effectively addresses the operational needs and administrative inefficiencies of the Municipality of Dasol.

RESULT AND DISCUSSION

Web-based tourism portals improve travel planning and tourism management for both visitors and local administrators. By establishing a centralized digital architecture, a unified platform can be effectively implemented to enable tourists to systematically coordinate accommodations and navigate local attractions online. The following discussions present the proposed stakeholder interaction model, system framework, and the layered three-tier architecture of the VisitDasol Web Portal.

Proposed System Framework and Three-Tier Architecture

A framework is a conceptual structure intended to support the development of a functional system [10]. A web-based tourism framework provides the architecture needed to manage online tourism services and reservations. Modern travelers and tourism administrators prefer cloud-based and real-time platforms over traditional manual systems [11].

Typically, tourism platforms include modules such as user accounts, accommodation listings, booking systems, GIS mapping, and administrative dashboards. In the development of the VisitDasol portal, these functional modules will be structurally organized using a decoupled three-tier architecture pattern [7]. This engineering approach separates operations into three distinct processing layers the Presentation Tier, the Application Tier, and the Data Tier ensuring that each layer can be independently maintained, upgraded, and scaled without affecting the performance of the others.

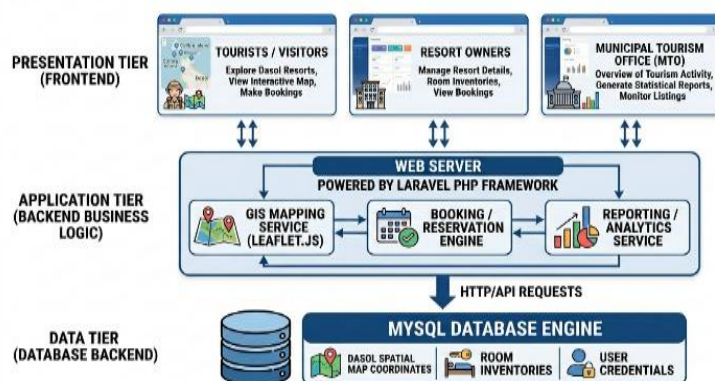


Figure 2. VisitDasol Three Tier Architecture Design

To translate this layered three-tier architecture into concrete user pathways, a comprehensive set of interface layout designs will be structurally engineered. Figure 3-8 provides the user interface prototype schematics mapping the presentation Map tier environments for frontend public views, the interactive GIS dashboard, the municipal tracking terminal, and the property owner portal.

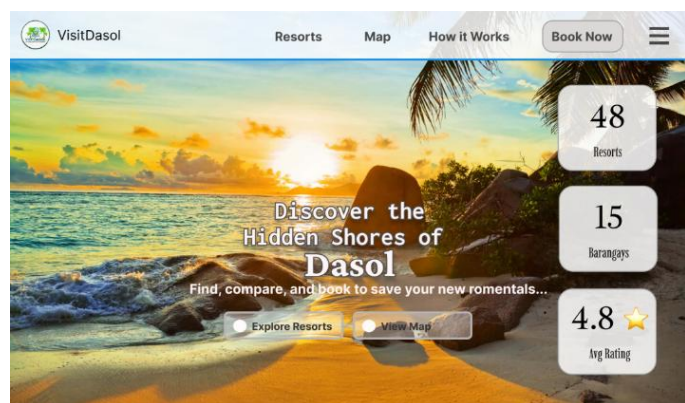


Figure 3. Homepage design

The Landing Page is the main entry point of the VisitDasol portal, showcasing the scenic beauty of Dasol, Pangasinan through a visually engaging hero section. It features a centralized search bar for filtering accommodations by barangay, check-in dates, and guest capacity. KPI cards display active resort counts and average ratings, while a Featured Resorts grid and GIS-integrated map preview help tourists explore nearby attractions and lodging options for easier travel planning.

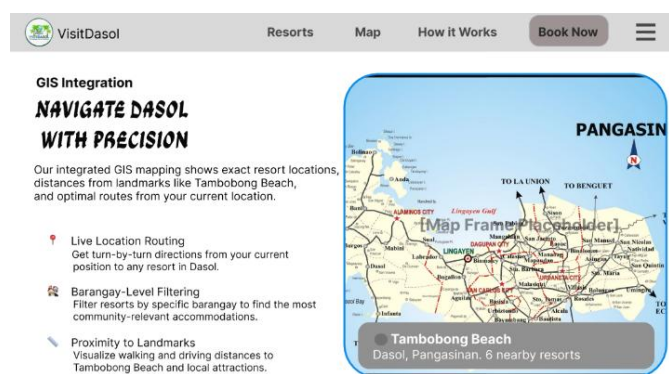


Figure 4. Map interface Design

The GIS-Integrated Tourism Map provides an interactive spatial view of Dasol's tourism destinations. Tourists can filter locations by barangay and explore resorts, landmarks, and attractions on the map. A dynamic sidebar

displays nearby accommodations, while routing and proximity features help users plan travel logistics and measure distances to key destinations like Tambobong Beach, creating a more organized and convenient travel experience [8].

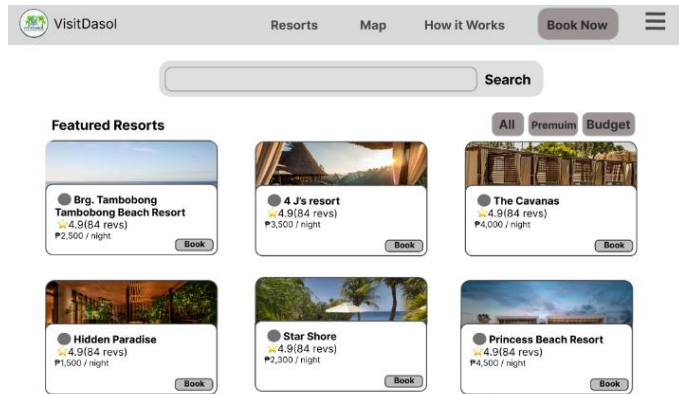


Figure 5. Featured Resorts Design

The Featured Resorts page acts as a digital catalog where tourists can compare and choose accommodations based on their preferences. Users can filter resorts by stay type, such as beach resorts, inland stays, or budget-friendly options. Each property card displays key details, including images, ratings, price per night, and amenities. A “Favorite” feature allows users to save resorts for future planning, while the organized grid layout makes browsing and decision-making easier for travelers visiting Dasol.

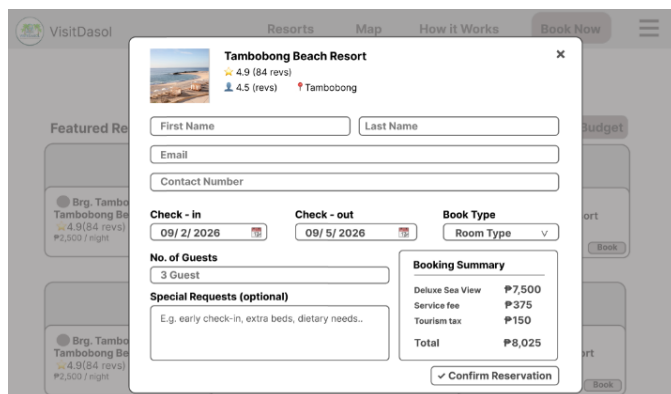


Figure 6. Booking Form Design

The booking mode for Tambobong Beach Resort provides a simple and organized way for guests to complete their reservation. It features sections for personal details, date selection, and special requests, along with a clear Booking Summary showing costs such as service fees and tourism taxes. Its streamlined design ensures a smooth transition from browsing to confirming a booking.

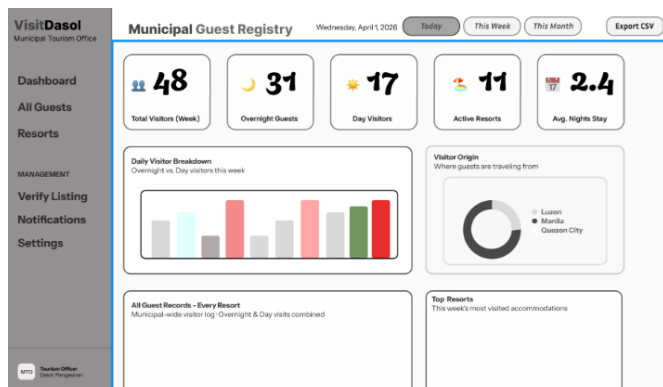


Figure 7. Municipal Tourism Dashboard Interface Design

The VisitDasol Tourism Office Municipal Guest Registry dashboard provides an overview of local tourism activity, displaying key metrics such as weekly guest counts and average stay duration. It includes sections for daily visitor breakdowns, visitor origins, and top-rated resorts to help administrators monitor tourism trends. With its organized layout and sidebar navigation, the system streamlines the management of municipal guest records and resort listings.

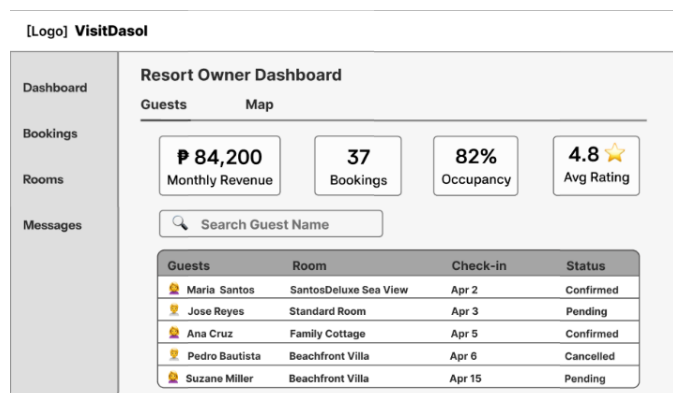


Figure 8. Resort Owner Dashboard Design

The VisitDasol Resort Owner Dashboard provides a centralized platform for managing guest information and monitoring property performance. Owners can view key metrics such as monthly revenue, occupancy rates, and average ratings, while also tracking bookings through a real-time guest list. Its sidebar navigation allows easy access to bookings, rooms, and messages, helping streamline daily resort operations.

The prototype developed for the VisitDasol Web Portal successfully demonstrates the feasibility of a unified, multi-tenant digital architecture for local tourism management. By decoupling the platform into a structured Three-Tier Architecture, the prototype ensures that high-traffic public interactions, data processing, and back-end municipal databases can scale independently without bottlenecking system performance.

CONCLUSION

In order to sustain the stability and growth of local tourism economies, innovation to traditional administrative frameworks is essential to deal with a wider range of target markets. Designing and creating a centralized data structure is important to secure customer transactions as well as the municipality and local resorts as unified entities. The proposed development of the VisitDasol Web Portal aims to address the persistent operational challenges of information asymmetry, manual data fragmentation, and the extreme geographical disconnect between the Municipal Tourism Office and remote coastal tourism sites.

The proposed design architecture comprising a Leaflet.js presentation layer, a Laravel application server, and a MySQL spatial database will provide a highly scalable, maintainable, and independently upgradeable framework suitable for local government deployments operating under limited technical resources. Moreover, the five integrated system modules will collectively replace fragmented, paper-based workflows by establishing real-time cloud synchronization between tourists, local resort owners, and municipal administrators.

It is anticipated that the evaluation of the platform will yield overall ratings in the Excellent range, establishing its technical soundness and readiness for full municipal deployment. Beyond improving administrative and operational efficiency, the platform will introduce the ecotourism assets of the Salt Capital to the broader digital market while enabling evidence-based decision-making, equitable visibility for small-scale operators, and the mitigation of over-capacity friction at environmentally sensitive coastal sites providing a strategic path to sustain the local tourism industry in Dasol, Pangasinan.

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