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DEVELOPMENT OF SOFTWARE FOR ONLINE BOOKING OF LEISURE AND ENTERTAINMENT SERVICES

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Анотація

У роботі розглянуто розробку програмного засобу онлайн-бронювання послуг у сфері відпочинку та розваг (квитки, тури, заходи) з підтримкою повного циклу взаємодії користувача з сервісом: перегляд пропозицій, вибір часу/місць, оформлення бронювання, отримання підтвердження та керування замовленням. Запропоновано модульну архітектуру з ролями «клієнт/адміністратор/менеджер контенту», календарем доступності, підсистемою сповіщень та журналом подій, що забезпечує простежуваність змін. Окрему увагу приділено безпеці та захисту персональних даних: рольовому доступу, аудит-логам, мінімізації даних та відповідності вимогам GDPR для онлайн-сервісів. Для оцінки ефективності визначено KPI (час підтвердження бронювання, частка скасувань, завантаження ресурсів, конверсія перегляд→бронювання) і підхід до порівняння показників до/після впровадження.

Ключові слова: онлайн-бронювання, дозвілля, квитки, тури, календар доступності, сповіщення, рольовий доступ, GDPR.

Abstract

This paper addresses the development of an online booking application for leisure and entertainment services (tickets, tours, events). The solution supports the end-to-end user journey: browsing offers, checking real-time availability, creating a reservation, receiving confirmation, and managing changes or cancellations. We propose a modular architecture with clear separation between the public catalogue, booking engine, availability calendar, notification service, and an administrative back-office for managing offers and capacities. Security and privacy are treated as first-class requirements: role-based access control, immutable audit trails, data minimisation, and lawful processing under GDPR are incorporated into the design. The expected outcome is an MVP that can be integrated with third-party ticketing providers and payment gateways, while enabling KPI-driven evaluation (confirmation time, cancellation rate, resource utilisation, and view-to-booking conversion).

Keywords: online booking, leisure services, event ticketing, availability calendar, notifications, RBAC, audit log, GDPR.

The leisure and entertainment sector increasingly relies on digital channels to attract customers and distribute capacity. However, small and medium providers (local venues, tour operators, studios, activity organisers) often combine several disconnected tools: social-media messaging for enquiries, spreadsheets for schedules, and manual phone confirmation. This fragmentation increases response time, creates double-booking risks, and reduces conversion, especially during peak demand.

The aim of the work is to design and implement a software product that enables users to browse offers and book services online, while giving administrators practical controls over availability, capacities, and the booking lifecycle. The object of the study is the end-to-end booking process in leisure and entertainment services, and the subject is the set of architectural and software solutions required to integrate a catalogue, booking engine, and administrative management module.

From a business-process perspective, the proposed solution formalises the following stages: (i) publication of offers (events, tours, sessions) with constraints (time slots, venue capacity, pricing rules); (ii) customer selection and availability check; (iii) reservation creation and confirmation; (iv) changes,

refunds, and cancellations; and (v) administrative reporting and analytics. The process is modelled to minimise manual actions and reduce confirmation latency [1, 3].

The architecture is organised around a service-oriented modular core. The public-facing layer provides a searchable catalogue and booking UI, whereas the domain layer encapsulates availability, pricing, and reservation rules. A dedicated notification service delivers confirmations and reminders via email/SMS/messengers. The back-office enables administrators to manage inventories, publish schedules, review booking histories, and resolve conflicts. A lightweight integration layer (REST API and webhooks) supports synchronisation with external ticketing providers and calendars [2, 4-6].

For availability management, the system maintains a canonical calendar of resources (venues, guides, seats, time slots) and uses optimistic concurrency control to prevent double bookings across concurrent requests. When multiple resources must be allocated (e.g., guide, vehicle, and time slot), reservation transactions validate constraints atomically and return immediate feedback to users. Such real-time performance requirements are well-documented for reservation systems operating under peak loads [6].

Security and privacy are critical because booking workflows process personal data (names, contacts, preferences) and, at times, payment-related metadata. The design adopts role-based access control (RBAC) with least-privilege permissions, immutable audit logging for administrative actions, and secure session management aligned with OWASP ASVS recommendations [7]. For EU users (including minors in certain cases), lawful processing and transparency requirements must be satisfied; legitimate interest as a legal basis requires a documented balancing test and safeguards, as summarised by the EDPB guidelines [5].

If payment processing is integrated, the MVP delegates card data handling to PCI-compliant payment service providers and limits the system to tokenised references and receipts. This reduces scope while still meeting operational needs. Where in-scope components exist, PCI DSS requirements (notably multi-factor authentication and monitoring) inform security controls [8].

The system’s effectiveness will be assessed through KPI before/after comparison: average time to confirm a booking, share of cancellations and no-shows, utilisation of capacity by time period, and the conversion rate from offer views to completed reservations. Additional operational metrics include administrator handling time per booking and the frequency of conflict resolution interventions. The expected result is an MVP that standardises booking operations, improves customer experience, and provides actionable analytics for service capacity planning.

СПИСОК ВИКОРИСТАНОЇ ЛІТЕРАТУРИ

1. Encarnacion, R.; et al. Booking and Reservation System: A Unified Application Using Location-Based Services for Sustainable Tourism Networks. — 2024.
2. Fadilah, N.; et al. Design of a Web-Based Platform: Event-Venues Booking and Management System. — In: Intelligent Computing and Innovation on Data Science, 2022. — DOI: 10.1007/978-981-19-2840-6_35.
3. Arzoumanidis, I.; Petti, L.; Raggi, A. Online booking platforms: Towards making more sustainable choices. — Cleaner Production Letters, Vol. 3, 2022, 100009. — DOI: 10.1016/j.clpl.2022.100009.
4. Niu, T.; Lei, B.; et al. A Review of Optimization Studies for System Appointment Scheduling. — Axioms, 2024, 13(1), 16. — DOI: 10.3390/axioms13010016.
5. European Data Protection Board. Guidelines 1/2024 on processing of personal data based on Article 6(1)(f) GDPR. Version 1.0, adopted 8 October 2024.
6. Boukhachba, A.; et al. Real-Time Performance Optimization of Travel Reservation Systems Using Customer-Centric Approaches. — arXiv:2412.06874, 2024.
7. OWASP. Application Security Verification Standard (ASVS) v4.0.3. — 2023.
8. PCI Security Standards Council. Payment Card Industry Data Security Standard (PCI DSS) v4.0.1. — 11 June 2024.

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