

UNDERGRADUATE PROJECT REPORT

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| **Module Name:** | **Project** |
| **Date Submitted:** | **12/31/2024** |

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# **Introduction**

## **Background**

With the rapid development of Internet technology and digital transformation, tourism information management has become more and more complex and challenging. Traditional tourism management methods often struggle with the problems of bulky business processes, cumbersome information processing, and limited data security. The growing amount of travel-related information requires an efficient, secure and user-friendly management system to simplify operations and enhance user experience.

This project aims to design and implement a tourism information management system using Spring boot framework and vue. The tourism information management system is based on web, so users, travel agencies and managers can access the tourism information management system quickly and conveniently from different devices. Through this system, users can find the destination of their favorite travel mode, and travel agencies can manage and release their travel projects more easily through this system, so as to improve the overall operation efficiency.Studies have demonstrated that leveraging the Spring Boot framework in tourism management system development can effectively improve both development efficiency and the user experience (Zhao et al., 2024)[1]. Additionally, applying fuzzy algorithms in the design of tourism information systems enhances the processing efficiency and accuracy of information handling (Wen, 2023)[2].

## **Aim**

This project aims to develop a comprehensive web-based student tourism management system to address the inefficiencies and limitations of current tourism information management practices. The system will provide a streamlined, secure and user-friendly platform for students, individual travelers, travel agencies, travel agencies and educational institutions to plan their trips, manage reservations, obtain the latest travel information, and improve the user travel experience.

## **Objectives**

A comprehensive analysis of current tourism information management practices is presented

1. Intuitive Navigation

2. Efficient Database Design

3. System Testing and Evaluation

4. System Deployment and Integration

5. Maintenance and Support

## **Project Overview**

### **Scope**

The student tourism management system will facilitate real-time data management, enabling users to efficiently process reservations, manage customer information, and generate reports. The software integrates a comprehensive set of modules including user management, tourist attraction search, accommodation information, travel route planning, and booking management, all in a user-friendly interface. Studies have shown that implementing modularized designs in tourism systems significantly enhances system scalability and usability (Patelski and Pazderski, 2024)[3]. In addition, the system prioritizes data security through comprehensive safeguards and incorporates a continuously improved user feedback mechanism, ensuring a reliable and responsive platform for all stakeholders. The system will provide a web-based interface accessible across multiple devices, ensuring flexibility and convenience for users ranging from individual travelers to tourism service providers.

### **Audience**

The main audience of the software includes tour operators, travel agents, and educational institutions offering tourism management courses. These users need a reliable system to efficiently manage their operations, ensure user satisfaction such as students and simplified processes. By addressing the specific needs of these stakeholders, the project aims to provide a platform for efficient operational efficiency and a solution for information management.

# **Background Review**

**2.1 Overview of Tourism Management Systems**

In the digital transformation of tourism industry, tourism management system is becoming more and more important. There are many tourism management systems with different functions on the market. But these systems are not powerful enough. As mentioned in "Design of tourism marketing management system based on SWOT analysis", In order to improve the accuracy and efficiency of tourism marketing management system, this paper proposes and designs a tourism marketing management system based on SWOT analysis.(Luo, 2022)[4].However, the current systems in the market do not seem to have achieved the expected results. In the next section, I analyzed and compared several commonly used systems on the market, analyzing their pros and cons, main features and user experience. These systems are designed to simplify information processing, enhance user experience, and provide comprehensive solutions for travel-related services. And The experimental results show that, compared with the traditional tourism marketing management system, the designed system has higher management accuracy and shorter management time(Kong, Zhang and Tan, 2021)[5]. It is hoped that through the following analysis and comparison, we can find out the problems and solutions of the existing systems.

**2.2 Competitive Analysis of Existing Tourism Management Systems**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **System** | **Strengths** | **Limitations** | **Key Features** | **User Experience** |
| System A:TripAdvisor  (<https://www.tripadvisor.com/>) | Comprehensive feature set | Complex user interface | Extensive tourism information database | Steep learning curve |
| Multiple language support | Overwhelming for new users | User-generated reviews and ratings | Overwhelming for new users |
| Global destination coverage | Information overload | Multiple service recommendations | Requires significant navigation |
| System B:Booking.com (<https://www.booking.com/>) | Clean design | Limited data security | Efficient data processing | Minimalist interface |
| Quick information retrieval | Narrow functionality | Basic booking capabilities | Relatively user-friendly |
| Price comparison tools | Limited service scope | Hotel-centric platform | Straightforward booking process |
| System C: Expedia  (<https://www.expedia.com/>) | Mobile-friendly | Inconsistent updates | Real-time location services | Moderate user satisfaction |
| Social media integration | Limited customization | User review integration | Good mobile experience |
| Multi-service platform | Potential pricing variations | Comprehensive travel booking | Intuitive mobile interface |

Table 2.1: Comparative Analysis of Tourism Management Systems

Table 2.1 compares and analyzes the technical characteristics and functional differences of current mainstream tourism management systems, focusing on the comparison of dimensions such as system architecture, key functions, user experience and technical implementation. A horizontal comparison between TripAdvisor, Booking.com, and the tourism management system to be developed in this study reveals the advantages and disadvantages of different platforms in terms of real-time booking, personalized recommendation, user interaction, and technical architecture. The comparison results show that the system in this study has significant technical innovation and competitive advantages in terms of microservice architecture, front-end and back-end separation, responsive design and intelligent recommendation algorithm, which is expected to provide more intelligent, efficient and user-friendly tourism service solutions.

**2.3 Research Methodology and Technical Architecture**

This study uses Java Spring Boot as the back-end framework and Vue.js as the front-end technology to build a modern tourism management system. Through microservice architecture and front-end separation design, the system aims to provide a high-performance and scalable tourism service platform. Spring Boot provides strong dependency injection, security features, and microservices support for the backend, while Vue.js ensures a responsive and interactive interface for the front-end. Referring to leading platforms such as TripAdvisor and Booking.com, the system will integrate advanced features, including intelligent search, real-time booking, user rating system and personalized recommendation. The system not only meets users' diverse travel service needs, but also provides smooth and intuitive user experience. The key technical innovations include efficient data processing mechanism, flexible component architecture and comprehensive error handling strategy. In particular, the system's real-time data processing capabilities are informed by a comprehensive review of IoT applications, which emphasizes the importance of low-latency processing and robust security measures (Dingorkar et al., 2024)[6].

# **Technical Progress**

## **Approach**

Requirements gathering

The project requirements were gathered through a comprehensive review of existing online tourism platforms and relevant literature. This approach allowed for efficient identification of industry best practices and common features offered by successful tourism management systems. Analyzing existing systems provided valuable insights into user expectations and helped define the scope of the project.

Software Development Model

The agile development model, specifically the Scrum framework, was chosen as the primary software development method for this project. The project will be divided into multiple short-term iterations called sprints.

The Scrum model will be implemented using one-month sprints, each encompassing sprint planning, daily scrums, development and testing, sprint reviews, and sprint retrospectives. This iterative process allows for continuous feedback and adaptation throughout the project.

Testing and Evaluation

In the testing phase, we use the method of combining unit testing and integration testing to ensure the normal function of each module and the overall coordination of the system.

Evaluation process

After the completion of the project, we will conduct a comprehensive system evaluation, using performance tests and security tests to verify the reliability and security of the system. We will also conduct user surveys to evaluate the effectiveness of the system in practical applications and user satisfaction.

At this stage, formulate a research question so that in the future, it will not

Crosses boundaries and is based on the research question.[2]

## **Technology**

**Tourism management system to build the required software:**

Database: Mysql(8.0+)

Frontend: Vue.js(3.x) , Bootstrap(5.x) JQuery

Backend: spring Boot (2.6+), Java 11/17

Development tool: IntelliJ IDEA, Git ,Maven/

**Tourism management system to build the required hardware:**

CPU: i7-10875H

GPU: NVIDIA GeForce RTX 2070 Super

RAM:16GB DDR4 3200MHz

The tourism management system selected MySQL 8.0+, Vue.js 3.x, Bootstrap 5.x and Spring Boot 2.6+ and other advanced technology stacks, aiming to build a high-performance, scalable and modern system. MySQL provides powerful data storage and retrieval capabilities, Vue.js and Bootstrap work together to create a beautiful, responsive user interface, and Spring Boot supports flexible microservices architecture and efficient backend development. Java 11/17 provides stability and security, while development tools such as IntelliJ IDEA, Git, and Maven further improve development efficiency and code quality. This technology combination not only meets the complex business requirements of the tourism management system, but also provides users with a smooth and intelligent management experience. The selection of Java 11/17 is particularly noteworthy for its performance enhancements and new language features, which are crucial for modern application development (Drosopoulou, 2024)[7].

## **Testing and Evaluation Plan**

Function testing

Objective: To verify the correctness and independence of each functional module of the system.

Sample test case:

• User login module

Test case: Enter the correct user name and password to verify whether the system can login normally

Test case: Enter the wrong username or password, verify that the system correctly returns the error message

• Attraction query module

Test case: Verify that the attraction search function returns accurate results

Test case: Check that the attraction details are fully displayed

User acceptance testing

Objective: To ensure that the system meets user needs and intended business processes.

Sample test case:

• Travel route planning module

Test case: To verify whether the system can recommend suitable travel routes based on user preferences

Test case: Check that the details of the route planning are accurate

• Hotel reservation module

Test case: Test if the hotel booking process is smooth

Test case: Verify that the reservation information is saved and processed correctly

Regression testing

Objective: To ensure that the addition of new functionality does not break existing system functionality.

Test plan:

After adding new features, test the existing feature modules one by one

Ensure that the core functions such as login, registration, and scenic spot query can still operate normally

Evaluation plan

Evaluate the system from the following key aspects:

Functional correctness:

Ensure that the system meets all the functions in the requirements specification

Performance Efficiency:

Evaluate system response time

Check resource usage

User interface:

Check that the interface is user-friendly

Verify that the operation flow is intuitive

Security:

Verify the security measures of the system

Review user data protection mechanisms

Stability:

Test system performance under long run and heavy load

Testing tools and methods

Using Selenium for automated testing

Unit testing with JUnit

Use performance testing tools such as JMeter for load testing

## **Design and Implementation**

In the development of the project, I have so far completed the following stages:

1.User needs analysis: Through browsing the information of some commonly used tourism management systems on the Internet, understand and collect the basic needs of tourism management system users.

2. Determine the design function: Through the requirements, determine the basic function of the tourism management system.

3. Formulate phased development plan: accurately estimate the total time required for project development and formulate a project development plan.

4 Technology Choice: In this project, I choose java as the development language and Spring Boot as the development framework. At the same time, the required development environment is built.

1. Client design: Start designing the user interface and basic functions, establish the basic UI framework, build the basic page structure and style, such as login/registration, login function database construction.

Some examples:

CREATE TABLE users (

user\_id INT AUTO\_INCREMENT PRIMARY KEY,

username VARCHAR(50) NOT NULL UNIQUE,

password VARCHAR(255) NOT NULL,

email VARCHAR(100) NOT NULL UNIQUE,

role ENUM('student', 'tourism', 'admin') NOT NULL,

created\_at TIMESTAMP DEFAULT CURRENT\_TIMESTAMP

);

CREATE TABLE students (

student\_id INT AUTO\_INCREMENT PRIMARY KEY,

user\_id INT NOT NULL UNIQUE,

name VARCHAR(100) NOT NULL,

gender ENUM('male', 'female', 'other'),

birth\_date DATE,

phone VARCHAR(20),

FOREIGN KEY (user\_id) REFERENCES users(user\_id)

);

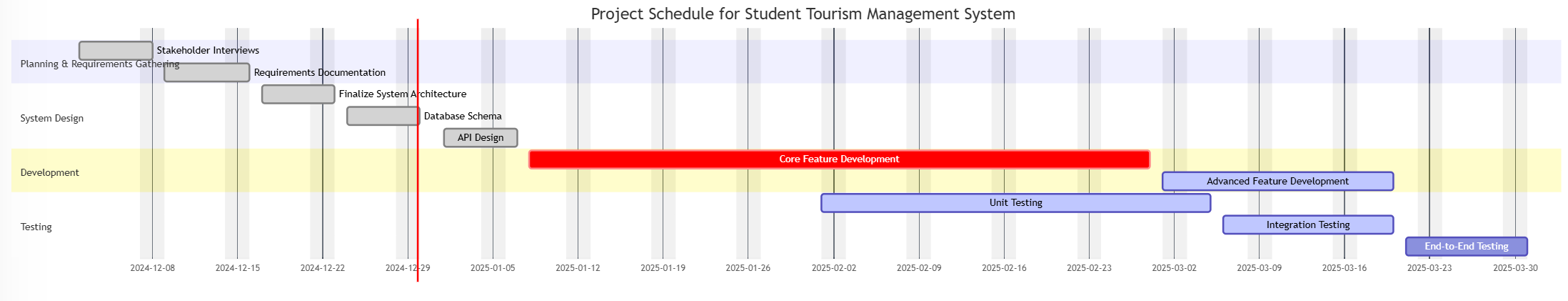
# **Project Management**

## **Activities Table**

| Objective | Task Description | Status (Complete/Incomplete) |
| --- | --- | --- |
| System Design | Finalize the system architecture and design documents | Complete |
| Database Setup | Establish the database schema and populate with initial data | Incomplete |
| Feature Development | Implement core functionalities such as user registration and service proposal | Complete |
| UI/UX Design | Develop wireframes and prototypes for the web application interface | Complete |
| Testing | Conduct unit tests and integration tests on implemented features | Incomplete |
| Deployment | Set up hosting environment and deploy the application | Incomplete |

## Activities Table

## **4.2 Schedule**



## **4.3 Project Version Management**

Version control is handled through Git, hosted on Gitee, ensuring that all changes are tracked and can be rolled back if necessary. Each commit includes detailed messages describing the changes made, which facilitates easier debugging and understanding of the codebase. Branching strategies follow GitFlow methodology, with branches named according to their purpose (feature/, bugfix/, hotfix/). Regular backups of the repository are stored in Baidu Drive, providing redundancy and protection against data loss. Additionally, semantic versioning is used to manage software releases, ensuring clarity around updates and backward compatibility.

## **Project Data Management**

Project-related documents and resources are meticulously organized within Baidu Drive, following a structured folder hierarchy for easy access. Logs are categorized by date and activity type, allowing for efficient troubleshooting. Reports are stored in a dedicated section, tagged with metadata for improved searchability. Literature reviews and research papers are kept in a separate folder, annotated with summaries for quick reference. A shared calendar is maintained to track deadlines and meetings, ensuring team members stay synchronized. Security measures include restricted access permissions and encryption for sensitive files.

## **Project Deliverables**

(1) Project Proposal

(2) Progress Report

(3) Final Report

(4) Project Code

# **Professional Issues and Risk:**

## **Risk Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Risk** | **Likelihood** | **Impact** | **Risk Management Approach/Mitigating Actions** | **Early Warning Signs** |
| **Technical Risks** |  |  |  |  |
| Mobile Compatibility Issues | High | High | Responsive design for various devices; Thorough testing across different operating systems and devices. | User feedback indicating display or functionality issues on mobile; Low mobile traffic. |
| Data Synchronization and Consistency Problems | Medium | High | Robust synchronization mechanisms; Asynchronous data synchronization using message queues. | Data loss or inconsistency; System performance degradation. |
| Map Service Integration Challenges | Medium | Medium | Evaluate map service providers and select appropriate APIs/SDKs; Develop and thoroughly test integration plan. | Map functionality errors; Integration costs exceeding budget. |
| System Security Vulnerabilities | High | High | HTTPS encryption; Strong user authentication and authorization; Regular security scans and penetration testing; Professional security audits. | Unauthorized access or data breaches; System attacks. |
| Performance Bottlenecks | Medium | High | Performance and stress testing; Database design and query optimization; Caching strategies. | Slow system response times; Poor user experience. |
| Business Risks |  |  |  |  |
| Low User Engagement | High | High | Social features (reviews, trip sharing); Personalized recommendations; Regular online/offline events. | Low user activity and retention rates. |
| Difficulty Integrating Travel Resources | High | Medium | Establish partnerships with travel providers; Standardized data interfaces; Robust resource management system. | Difficulty acquiring necessary travel resources; Inaccurate resource information. |
| Unclear Revenue Model | Medium | High | Explore diverse revenue streams (ads, commissions, value-added services); Develop a reasonable pricing strategy. | Revenue insufficient to cover operational costs; Difficulty attracting inve |
| **Market Risks** |  |  |  |  |
| Intense Competition | High | High | Target student demographics with specialized services (student discounts, exclusive trips); Strengthen brand marketing. | Loss of market share; Slow user growth. |
| Legal and Regulatory Risks |  |  |  |  |
| Inadequate Data Privacy Protection | High | High | Implement and adhere to data privacy policies (e.g., GDPR); Obtain explicit user consent for data collection and usage; Secure data storage and transmission. | User complaints; Regulatory penalties. |
| Other Risks |  |  |  |  |
| Force Majeure (e.g., Pandemic) | Low | High | Contingency plans (e.g., online travel services, flexible itinerary adjustments). | Disruption of travel activities due to unforeseen events; Large-scale trip cancellations. |

Risk Assessment Table

## **Professional Issues**

Ethical considerations are paramount, especially concerning user data privacy and integrity. Compliance with GDPR and other relevant regulations ensures that personal information is handled responsibly. Social implications involve promoting fair access to travel services among students, avoiding biases in recommendation algorithms, and supporting sustainable tourism practices. Environmental impacts are minimized by leveraging digital platforms over paper-based processes, thereby reducing carbon footprints. Legal considerations encompass adherence to intellectual property laws, terms of service agreements, and clear communication of privacy policies. Ethical guidelines from professional bodies like BCS and ACM guide the development process, emphasizing transparency, accountability, and respect for user rights. Additionally, the project aims to foster community engagement by encouraging peer-to-peer interactions and feedback loops. This not only enhances the user experience but also builds trust and loyalty within the student community. By addressing these professional issues proactively, the project seeks to establish a robust foundation for long-term success and positive social impact. The importance of ethical considerations in the design and deployment of autonomous and intelligent systems is emphasized by the IEEE Global Initiative, which works on varied fronts to prioritize ethical considerations and environmental sustainability(Chatila et al., 2017)[8]. The effectiveness of peer interaction in facilitating learning is well-documented, with studies showing that such interactions can significantly promote learning outcomes.(Tenenbaum et al., 2020)[9].

|  |  |  |  |
| --- | --- | --- | --- |
| **Category** | **Issue Description** | **Relevant Code of Conduct** | **Mitigation Strategy** |
| Legal Issues | Data Privacy and Protection: Ensuring compliance with data protection regulations. | GDPR, BCS: Respect for privacy and confidentiality, ensuring data is handled legally and ethically. | Implement strong encryption, anonymization techniques, and clear privacy policies. Ensure user consent. |
|  | IP and Copyright: Avoiding infringement on third-party intellectual property. | ACM: Respect for intellectual property and copyright laws. | Perform thorough IP audits of third-party libraries and tools. Obtain necessary licenses and permissions. |
|  | Contracts and Liability: Resolving contractual disputes with stakeholders. | BCS: Professional accountability and adherence to legal obligations. | Develop clear contracts with stakeholders, outlining responsibilities and escalation procedures. |
| Social Issues | Fairness and Inclusivity: Ensuring the system is fair and inclusive for all users. | ACM: Fairness in algorithms, avoiding discrimination in system design. | Design algorithms that are free from bias and ensure multilingual support for diverse user groups. |
|  | Community Engagement: Promoting sustainable tourism practices in the community. | BCS: Social responsibility and contribution to societal well-being. | Incorporate features that promote eco-friendly travel and community engagement through user feedback loops. |
| User Experience: Enhancing user satisfaction and accessibility. | ACM: Accessibility and usability standards to ensure inclusivity. | Conduct usability testing with diverse user groups and ensure the interface is intuitive and accessible. |
| Ethical Issues | Data Ethics: Ensuring user data is used ethically and transparently. | ACM: Transparency in data usage, ensuring user consent and privacy. | Provide clear explanations of how data is collected and used. Avoid data misuse or sharing without consent. |
| Responsibility and Accountability: Ensuring developers take responsibility for their work. | BCS: Professional accountability and ethical conduct in all activities. | Establish clear guidelines for ethical behavior, and ensure accountability through regular reviews and audits. |
| Algorithmic Bias: Avoiding biases in recommendations and decision-making. | ACM: Fairness in algorithms, ensuring unbiased outcomes. | Regularly audit algorithms for biases and involve diverse stakeholders in testing. |
| Environmental Issues | Digital Footprint: Reducing the environmental impact of system usage. | BCS: Sustainable development and minimizing environmental impact. | Optimize system performance to reduce energy consumption, promote paperless processes, and encourage eco-friendly travel options. |
| Data Center Energy Usage: Minimizing the environmental impact of hardware. | ACM: Environmental responsibility in computing practices. | Use energy-efficient data centers and cloud services, and implement green computing practices. |
| Sustainability in Development: Promoting sustainable practices in development. | BCS: Social responsibility and promoting sustainable practices. | Encourage the use of open-source tools and reusable components to minimize waste and improve efficiency. |

Legal, Social, Ethical, and Environmental Issues Table

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