Sri Lanka Institute of Information Technology

Information Technology Project (IT2080)

PLAY ZONE PRO

Play Zone Management System

Project Proposal

Submitted by:

ITP25_B1_08

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Feb 2025

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Background

The Playzone Management System (PMS) is designed for play zones and recreational centers that offer services like arcade games, indoor sports, and other leisure activities. These businesses cater to a growing number of customers, and as demand increases, so does the need for an efficient way to manage operations. Currently, the client relies on manual systems such as paper records and spreadsheets to handle bookings, finances, and resources. These outdated methods are prone to errors, inefficiencies, and delays, which negatively impact both customer satisfaction and business performance.

The client operates a popular play zone but struggles with managing multiple aspects of the business. Issues like overbookings, resource mismanagement, and inaccurate financial reporting arise due to the lack of a centralized, automated system. Furthermore, customer complaints and security incidents are not being properly tracked, leading to a poor user experience. As the business grows, these operational challenges become increasingly difficult to manage manually.

The Playzone Management System aims to solve these problems by providing an integrated digital platform that automates and centralizes key functions such as user management, booking reservations, financial tracking, and resource management. By replacing the current manual processes, the system will reduce errors, improve efficiency, and enable better decision-making. It will also provide real-time data that can help improve resource allocation, pricing strategies, and promotional campaigns.

Ultimately, the system will modernize the play zone's operations, enabling the business to scale effectively while maintaining a high level of service. With features designed to automate routine tasks, improve security, and enhance customer satisfaction, the Playzone Management System is essential for improving both operational efficiency and the overall customer experience.

Problems and Motivations

The current system for managing the play zone's operations is manual and fragmented. It relies on spreadsheets and paper forms, which lead to inefficiencies, errors, and difficulties in tracking real-time data such as bookings, reservations, resources, and financial transactions. Moreover, security issues and customer complaints are not effectively addressed, impacting overall user satisfaction.

1. **User Management Issues**

- **Current Problem:**
  The client currently lacks a centralized system for managing user accounts and their associated roles, leading to difficulties in tracking user data and granting appropriate access. User profiles, including membership status, preferences, and history, are stored in different systems, making it difficult to maintain an accurate and up-to-date record.
- **Motivation:**
  By implementing a **User Management System**, the business can streamline the registration, authentication, and role-based access of users, which ensures that data is consistent, accurate, and easy to access. This system will allow administrators to manage user profiles efficiently, reduce human error, and provide a more personalized customer experience, enhancing overall user satisfaction and improving operational efficiency.

2. **Booking and Reservation Conflicts**

- **Current Problem:**
  Booking and reservation processes are handled manually, often using paper records or spreadsheets. This results in errors such as overbookings, miscommunications about available time slots, and double-booked resources, which frustrate customers and cause operational inefficiencies.
- **Motivation:**
  Introducing an **automated Booking & Reservation Management** system will eliminate these issues by ensuring real-time updates on availability and reducing the chances of conflicts. Customers will be able to easily check availability, make reservations online, and receive instant confirmations, leading to fewer booking errors and a more seamless customer experience. This will also save time for the staff, allowing them to focus on more important tasks.

3. **Inaccurate Financial Management**

- **Current Problem:**
  Financial transactions, such as payments, invoices, and receipts, are manually tracked, which increases the likelihood of errors and delays in financial reporting. Additionally, the lack of automation makes it difficult to track financial performance in real-time, resulting in poor cash flow management and delayed decision-making.

- **Motivation:**
  With a **Financial Management** system in place, all financial data can be automatically recorded and tracked. The system can generate invoices, process payments, and provide detailed financial reports. Automation will reduce human errors, streamline financial operations, and allow the business to monitor cash flow in real time. This will improve financial oversight, enabling better decision-making and contributing to the overall profitability of the play zone.

4. **Play-zone Resources Mismanagement**

- **Current Problem:**
  The current system lacks a proper method to track the availability and usage of play-zone resources, such as arcade machines, rooms, or sports equipment. As a result, resources are sometimes overbooked, underused, or unavailable when needed, leading to customer dissatisfaction and inefficient resource allocation.
- **Motivation:**
  A **Resource Management** system will allow the business to track the status and availability of resources in real-time, ensuring optimal usage and reducing downtime. Customers will have better access to resources when needed, and the business will be able to plan maintenance or upgrades more effectively. This will not only improve customer satisfaction but also increase resource utilization, maximizing the business's efficiency and revenue.

5. **Security and Complaint Handling Inefficiencies**

- **Current Problem:**
  The play zone currently lacks a structured system for managing security incidents and customer complaints. Issues are often handled informally, which means they may not be documented, tracked, or resolved in a timely manner. This leads to dissatisfaction among customers and potentially compromises safety and security.
- **Motivation:**
  By implementing a **Security & Complaints Management** system, the business can ensure that incidents and complaints are formally logged, tracked, and resolved within a set timeframe. Customers will feel more secure knowing that their concerns are taken seriously, and the play zone will be able to maintain a safer environment for all. Additionally, this system will allow the business to identify recurring issues and implement preventive measures, improving both safety and customer satisfaction in the long run.

Aims and Objectives

User Management

Aim:

To develop an efficient and centralized User Management system that enables smooth user registration, profile management, and role-based access control, improving operational efficiency and customer experience.

Objectives:

1. Design a user registration and authentication system that allows new users to sign up and existing users to log in securely.
2. Implement a role-based access control system to manage different user roles (e.g., admin, staff, customers) and assign permissions accordingly.
3. Develop a user profile management interface for users to view and update their personal details, membership status, and booking history.
4. Ensure the system provides a secure, encrypted method for handling sensitive user information, such as passwords and payment details.
5. Create an admin dashboard that allows the management team to monitor user activity, manage accounts, and resolve any issues efficiently.

Booking and Reservation Management

Aim:

To create an automated Booking and Reservation system that allows users to make, manage, and track bookings in real-time, ensuring a seamless and conflict-free experience for both users and staff.

Objectives:

1. Develop an easy-to-use interface for customers to view the availability of play zones and book slots for various activities (e.g., arcade games, rooms, sports).
2. Implement real-time availability tracking to prevent overbookings or double-booking of resources.
3. Allow customers to receive instant email or SMS confirmations upon booking and reminders before their scheduled time.
4. Enable users to modify or cancel bookings with a defined process and conditions, reducing customer frustration.
5. Integrate a payment gateway to process reservations and collect payments securely during the booking process.

Financial Management

Aim:

To implement a robust Financial Management system that automates payment tracking, invoicing, and financial reporting, ensuring accurate and real-time financial data for both users and administrators.

Objectives:

1. Develop a system to process and record payments made by customers, including online payments and cash transactions.
2. Implement automatic invoice generation and provide customers with digital receipts for their bookings.
3. Create financial reports that provide insights into revenue, expenses, and profits for management analysis.
4. Integrate financial data with user bookings to track payment history and ensure accurate financial records.
5. Enable the system to handle discounts, coupons, and special offers to manage promotions and provide flexibility in pricing.

Play-zone Resources Management

Aim:

To design an efficient resource management system that tracks the availability, usage, and maintenance schedules of play zone equipment and spaces, maximizing utilization and minimizing downtime.

Objectives:

1. Develop a resource tracking system to manage the availability of play zone equipment and rooms (e.g., arcade machines, sports facilities, party rooms).
2. Implement real-time updates on resource availability, allowing users to book resources and ensuring that equipment or spaces are not double-booked.
3. Create an alert system to notify administrators when resources require maintenance or repair.
4. Develop an admin interface that allows staff to schedule maintenance and assign resources to users based on availability.
5. Integrate usage data and resource history to monitor performance, detect trends, and improve resource allocation.

Security & Complaints Management

Aim:

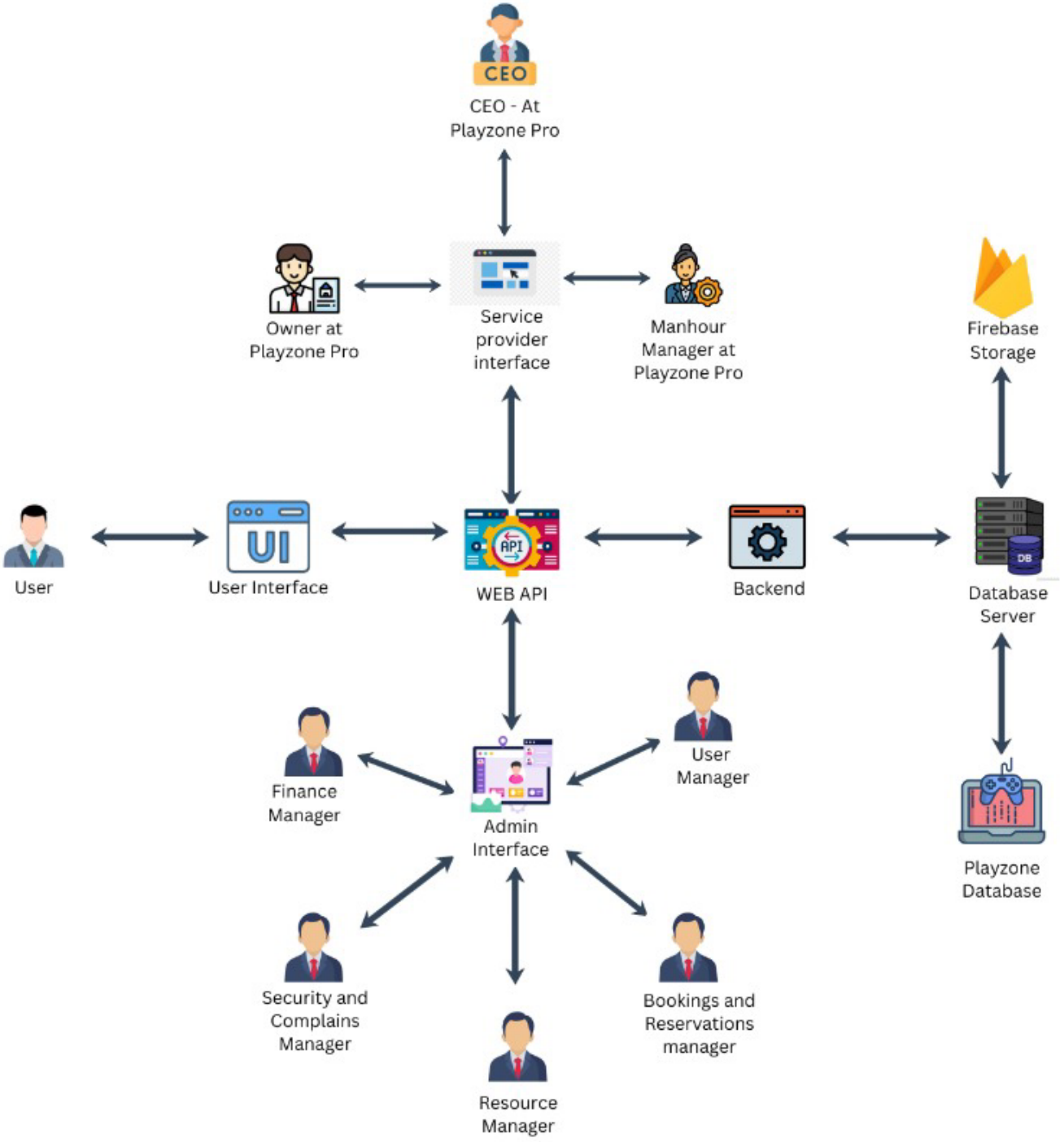
To implement a structured Security and Complaints Management system that ensures timely response to security incidents and customer complaints, fostering a safe and positive environment for users.

Objectives:

1. Develop a complaint submission form that allows customers to easily report issues, feedback, or security concerns.
2. Implement an automated system to track complaints and incidents, ensuring they are logged, prioritized, and assigned to the appropriate team member.
3. Provide a dashboard for administrators to monitor the status of complaints and security incidents in real-time.
4. Allow users to track the status of their complaints and receive timely updates on resolutions.
5. Integrate the system with incident reporting tools, such as cameras or alarms, to provide real-time security monitoring when needed.

System Overview

System Diagram



Functional Requirements

The following are the core **functional requirements** of the Playzone Management System:

1. **User Management:**
    - The system should allow users to create an account, log in, and manage their profile (update details, view booking history, etc.).
    - The system should support role-based access (e.g., admin, staff, customer), where each user role has specific permissions.
    - Administrators should have the ability to manage users (e.g., deactivate accounts, view activity logs).
2. **Booking and Reservation Management:**
    - Customers should be able to view the availability of play zones and make bookings for different activities.
    - The system should prevent overbooking by updating availability in real-time.
    - Users should be able to modify or cancel their bookings, subject to certain conditions.
    - The system should send confirmation emails and reminders for upcoming bookings.
3. **Financial Management:**
    - The system should process payments for bookings, generate invoices, and maintain financial transaction history.
    - Real-time reporting features should be available to provide insights into financial performance (revenue, expenses, etc.).
    - Integration with a secure payment gateway to process online transactions.
4. **Play-zone Resources Management:**
    - The system should track the availability and usage of play zone resources (e.g., arcade machines, sports equipment).
    - It should allow staff to schedule maintenance and ensure resources are not overbooked.
    - Resource usage data should be available to administrators for monitoring and optimization.
5. **Security & Complaints Management:**
    - The system should provide users with a way to report security concerns or customer service complaints.
    - Complaints should be tracked, prioritized, and assigned to staff for resolution.
    - Administrators should be able to monitor complaint statuses and generate reports to identify recurring issues.

Non-Functional Requirements

1. **Performance:**
   - The system must be able to handle concurrent users without significant degradation in performance. For example, it should support a high number of simultaneous bookings and payments without delays.
2. **Security:**
   - Data protection is critical, especially since sensitive information (user data, payment details) is involved. The system must implement encryption for data transmission (SSL/TLS), secure user authentication (multi-factor authentication), and role-based access control.
   - Regular backups and disaster recovery procedures should be in place to prevent data loss.
3. **Scalability:**
   - The system should be scalable to handle growing user bases, additional resources, and increasing transaction volumes over time.
   - The system should be able to expand with minimal changes to the core architecture.
4. **Usability:**
   - The system should have an intuitive and user-friendly interface that minimizes the learning curve for both customers and administrators.
   - Mobile responsiveness is essential so that users can access the platform from various devices (desktop, tablet, mobile).
5. **Availability:**
   - The system must ensure high availability, with minimal downtime. It should include monitoring tools to detect issues early and prevent service disruptions.

Technical Requirements

- Front-end development – ReactJS + Vite, Tailwind CSS
- Back-end Development – Node.js, Express.js
- Database – MongoDB
- APIs
- Authentication and Authorization – JWT (JSON Web Tokens)
- Firebase Cloud Storage and Authentication

Literature Review

In Sri Lanka, the play zone industry is rapidly growing, with many businesses seeking effective management systems to streamline operations. Below are several play zone management systems currently used in the Sri Lankan market, along with a critical review of their features, advantages, and limitations.

1. Romio Technologies' Kids Play Zone Management Software

Overview:
Romio Technologies offers a Play Zone Management Software designed specifically for managing children's play areas. The system facilitates booking, ticketing, party reservations, and food service management within play zones.

Pros:

- Booking & Ticketing: The system offers a reliable booking platform for customers to reserve time slots in advance, improving customer experience.
- Party Reservations**:** It allows for easy party bookings with customizable packages, which is an essential feature for play zones catering to group events.
- Food & Beverage Management: Integrates food and beverage services with the booking system, streamlining the operations of play zones that offer snacks and meals.

Cons:

- Resource Management Limitations: While the software covers ticketing and party bookings, it lacks advanced resource management tools, such as tracking play zone equipment, game stations, or room availability.
- User Interface: Some users have reported that the user interface could be more intuitive, especially for staff with limited technical knowledge.
- Scalability Issues: The system may face challenges in scaling for larger play zones, especially if the business has numerous facilities or multiple locations.

2. Semnox Solutions' Parafait Play Area and Activity Management System

Overview:
Semnox offers the Parafait system, which is an integrated solution for managing play areas. This system includes ticketing, wristband-based time management, customer engagement, and real-time reporting for play zones.

Pros:

- Integrated System: Combines hardware (wristbands) with software for easy management of bookings, customer access, and time tracking.

- Time Management: The use of wristbands helps track playtime, ensuring that customers adhere to their booked time slots.
- Customer Engagement: Includes features like an achievement module to engage customers and encourage longer playtimes, which could help with customer retention.

Cons:

- High Cost: The integration of both hardware (wristbands, scanners) and software makes the system relatively expensive to implement and maintain.
- Complexity: The system's complexity requires adequate staff training and can lead to operational challenges if staff is not properly trained.
- Customization Issues**:** The system may not be easily customizable to meet the specific needs of smaller or medium-sized play zones.

3. GenieSoft Play Zone Management System

Overview:
GenieSoft offers a Play Zone Management System tailored for Sri Lankan businesses. This system focuses on online booking, customer management, and event scheduling within play zones.

Pros:

- Online Booking System: GenieSoft provides an easy-to-use online booking system that allows customers to book time slots for activities and events.
- Customer Management: Includes tools for managing customer data, loyalty programs, and promotions, which helps build long-term relationships.
- Event Scheduling: Useful for organizing events and activities within the play zone, helping businesses to plan and execute events more efficiently.

Cons:

- Limited Integration Options: The system may not integrate well with other tools like POS systems or financial management software, limiting its usefulness for comprehensive business management.
- Lack of Real-Time Resource Management: While it offers booking and scheduling, there is limited functionality for real-time tracking of play zone equipment and resources.
- Basic Features: Some of the features offered are relatively basic and may not fully address the operational needs of a large or busy play zone.

Summary and Conclusion

The current play zone management systems in Sri Lanka, such as Romio Technologies' Kids Play Zone Management Software, Semnox's Parafait system, SLTMobitel's access management systems, and GenieSoft, provide valuable solutions for booking, ticketing, and customer management. However, they each have notable limitations:

- **Romio Technologies** and **GenieSoft** are more focused on booking and party reservations but lack advanced features for real-time resource management, maintenance tracking, and scalability.
- **Semnox's Parafait system** provides comprehensive features but is high in cost and complexity, making it more suitable for larger, well-funded businesses rather than smaller play zones.

Thus, there is a clear gap in the market for a Playzone Management System in Sri Lanka that integrates booking, resource management, financial tracking, and customer engagement into one affordable and scalable solution. A new system designed specifically for play zones, with an emphasis on ease of use, cost-effectiveness, and flexibility, could better address the unique needs of play zones in Sri Lanka.

Methodology

The ITP project development followed an agile approach, utilizing modern technologies and methodologies to ensure an effective and efficient execution.

The selected technology stack including React.js, and Tailwind CSS as the foundational components for front-end development, known for their robustness, scalability, and strong community support.

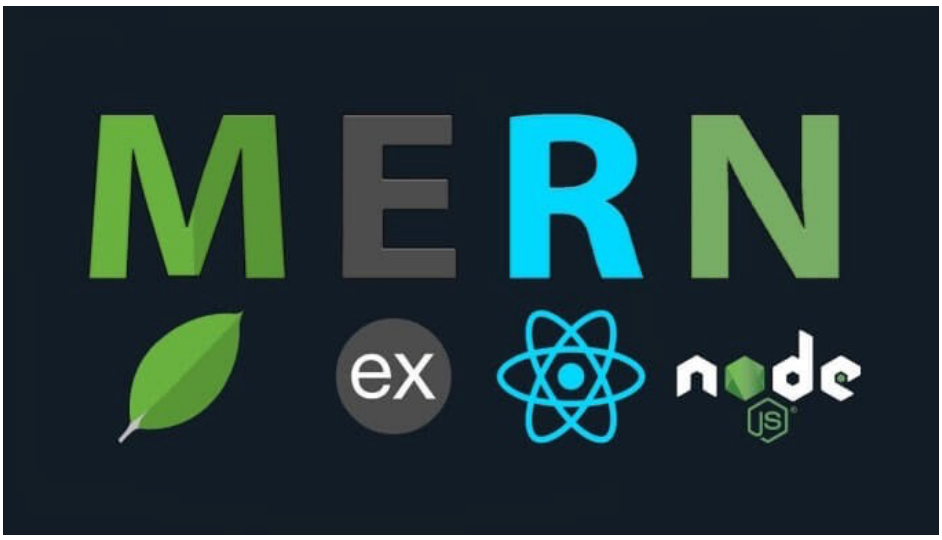
To enhance the UI design process, we have been used Figma, Tailwind CSS extension, Firebase was selected as the back-end infrastructure, leveraging its cloud database, authentication services, and storage capabilities.

The development structure utilized an Agile methodology, enabling the team to work in iterative sprints for continuous integration and testing. The Firebase Emulator played a crucial role in testing the applications. Functionalities within a local environment, complemented by the implementation of unit tests from the project's early stages.

To ensure efficient project management and collaboration, Trello, an Agile project management tool, was employed for task management, progress tracking, and development prioritization. GitHub served as the version control system, allowing seamless coding collaboration and version tracking.

Tools and Technologies

We use the MERN stack for developing our web application. MERN is a combination of 4 technologies: Node.js, Express.js, React.js, and MongoDB.



mongoDB. As a document-oriented database, MongoDB stores information in adaptable documents that resemble JSON. Projects handling unstructured or semi-structured data or needs that are flexible are a good fit for it.

Express JS Express is a well-liked Node.js framework for lightweight web applications. It provides an extensive feature set for developing online and mobile applications, APIs, and more.

React A well-liked JavaScript package called React is used to create single-page applications (SPAs) and user interfaces (UIs). Comprising reusable and encapsulated components, reacts component-based architecture facilitates the management and upkeep of intricate user interfaces

node JS An open-source, cross-platform runtime environment called Node.js can be used to create server-side networking apps that are highly performant and scalable.The I/O mechanism used by Node.js is event-driven and non- blocking.

Apart from MERN Stack we use the following tools and technologies in our project.

A free and open-source code editor that supports development activities (debugging, task execution, and version control) is called Visual Studio Code (VS code).

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Project Plan (Gantt Chart)

	February			March				April				May	
Tasks	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14
Problem Identification													
Requirements gathering													
Build a solution													
Charter submission													
Project Presentation													
Proposal submission													
System design													
Database design													
Project implementation													
Integration and testing													
Deployment													
Final viva													

Work Breakdown Structure (Work Distribution)

Task ID	Task Name	Description
1.1	Requirements Gathering	Gather and analyze requirements from stakeholders
1.2	Requirements Analysis	Analyze and document the requirements
1.3	Requirements Documentation	Create a detailed requirements document
2.1	System Design	Design the system architecture, user interface, and database schema
2.2	System Prototyping	Create a prototype of the system
2.3	System Review	Review and refine the system design
3.1	Front-end Development	Develop the user interface and client-side functionality
3.2	Back-end Development	Develop the server-side functionality and database integration
3.3	Integration Testing	Integrate the front-end and back-end components and test the system
4.1	Unit Testing	Conduct unit testing of individual components

4.2	System Testing	Conduct system testing to ensure the system meets the requirements
4.3	User Acceptance Testing	Conduct user acceptance testing to ensure the system meets the user's needs
5.1	Deployment	Deploy the system to the production environment
5.2	Maintenance	Provide ongoing maintenance and support for the system

Evaluation Method

The evaluation method for the Playzone Management System will be designed to assess the effectiveness, efficiency, usability, and performance of the system. The evaluation process will follow a structured approach that ensures all functional and non-functional requirements are met. The evaluation will be conducted through the following methods:

1. Functional Testing

Functional testing will ensure that all the features of the Playzone Management System work as intended. This will involve:

- **System Integration Testing:** To verify that the system's individual components (user management, booking, reservation, financial management, etc.) work seamlessly together.
- **Test Case Scenarios:** Each module will be tested against predefined test cases to validate core functionalities, such as booking accuracy, resource management, and financial transactions.
- **User Acceptance Testing (UAT):** This will involve key stakeholders (staff, users) interacting with the system to ensure it aligns with their expectations and requirements.

2. Usability Testing

Usability testing will focus on evaluating the system's ease of use and user experience. This method involves gathering feedback from real users and observing their interactions with the system. Key areas of focus will include:

- **Interface Evaluation:** Assessing how intuitive and user-friendly the interface is for staff and customers, with particular attention to ease of navigation.
- **Error Rate:** Measuring the frequency of user errors during system interactions (e.g., booking errors, navigation mistakes).
- **Customer Satisfaction Surveys:** Administering surveys to end-users (parents, customers) to gauge satisfaction levels with the system's ease of use.

3. Performance Testing

Performance testing will be used to ensure that the Playzone Management System can handle the expected load and deliver optimal performance under different conditions. This will include:

- **Load Testing:** Simulating high user traffic to test the system's response time and scalability, ensuring it can handle peak hours without performance degradation.
- **Stress Testing:** Pushing the system beyond its limits to observe how it reacts under extreme conditions (e.g., high numbers of concurrent users, complex queries).

- **System Stability:** Monitoring system uptime and stability during long periods of use, ensuring reliability.

4. Security Testing

Security testing will focus on ensuring that the Playzone Management System is secure from unauthorized access and data breaches. It will involve:

- **Data Protection:** Ensuring that personal and financial data stored in the system is encrypted and properly protected.
- **Access Control Testing:** Validating user roles and permissions to prevent unauthorized access to sensitive information.
- **Vulnerability Scanning:** Performing security scans to identify potential vulnerabilities and weaknesses within the system.

5. Financial Evaluation

This evaluation method will focus on assessing the financial aspects of the system, particularly the management of transactions, payments, and financial reports. It will include:

- **Transaction Accuracy:** Verifying that financial transactions (e.g., payments, refunds) are processed correctly and recorded in the system.
- **Financial Reporting:** Ensuring that financial reports (e.g., revenue, expenses) are generated accurately and can be easily accessed by management.
- **Cost-Benefit Analysis:** Evaluating the overall costs of implementing and maintaining the system compared to the benefits (increased revenue, cost savings, improved efficiency).

6. Customer Feedback

Customer feedback will be collected regularly to assess how well the system meets their needs and expectations. Methods include:

- **Surveys and Questionnaires:** Distributed to customers who have interacted with the system (both in terms of bookings and customer service) to measure satisfaction.
- **Focus Groups:** Conducting sessions with customers to gather detailed feedback on their experience with the system and suggest improvements.
- **Customer Retention Analysis:** Measuring customer retention rates over time to assess whether the system improves customer loyalty and satisfaction.

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