1. Project Definition

The **Theme Park Management System (TPMS)** is a centralized digital platform designed to automate and manage key theme park operations efficiently. It integrates ticket booking, ride scheduling, queue monitoring, food services and staff coordination into a single system. TPMS helps reduce waiting times, control crowd flow, minimize manual errors, and improve overall visitor experience. By enabling real-time monitoring and better resource management, the system ensures smooth operations and a well-organized, modern theme park environment.

2. Project Objective

The main objective of the Theme Park Management System is to design and develop a centralized and automated system that improves the overall functioning of a theme park by reducing manual work and enhancing customer satisfaction.

The objectives of the system are:

- To provide an online platform for easy and quick ticket booking.
- To display real-time ride availability, queue status and estimated waiting time.
- To manage food ordering and shop services digitally.
- To control and monitor crowd levels inside the park.
- To improve staff coordination and duty management.
- To generate accurate financial and operational reports.
- To reduce manual errors and paperwork.
- To enhance safety, transparency and system security.
- To provide better services and improve visitor experience.
- To create a scalable system that can be easily upgraded for future needs.

These objectives help the theme park operate more efficiently and deliver high-quality services through a single integrated digital platform.

3. Project Scope

The Theme Park Management System is developed to manage the daily activities of a theme park using a single web-based system, which can also be used as a mobile application in the future. The system helps in handling ticket booking, ride details, queue status, food ordering, parking services, staff work, and admin control in an organized way.

This system is useful for all people involved in theme park operations, such as:

- **Customers**, who can view available rides, check real-time queue and waiting time, book tickets online, order food, see their booking history, and give feedback using the system.
- **Staff**, who can manage ride operations, scan QR tickets at entry points, receive and process food orders, and perform their assigned duties through role-based access.
- **Admin**, who can manage rides, events, shops, prices, discounts, and monitor crowd levels and overall park activities.

Overall, the scope of this system is to reduce manual work, manage park activities smoothly, save time, and improve the experience for visitors and staff.

4. Project Modules

The system is divided into the following main modules to ensure smooth and efficient management of theme park operations:

4.1 Customer

- The system shall allow customers to register using email, mobile number and password
- The system shall allow registered customers to securely log in and log out.
- The system shall allow customers to view available rides with description, age limit and safety rules.
- The system shall allow customers to view current offers, discounts and membership benefits.
- The system shall allow customers to book tickets online for selected dates and time slots.
- The system shall generate a QR-code based e-ticket after successful payment.
- The system shall display real-time queue length and estimated waiting time for each ride.
- The system shall allow customers to reserve ride slots based on availability.
- The system shall allow customers to order food online from park restaurants.
- The system shall allow customers to view booking history.
- The system shall allow customers to submit feedback and ride ratings.

4.2 Staff

- The system shall allow staff to log in with role-based access privileges.
- The system shall allow staff to update ride operational status (ON/OFF/Maintenance).
- The system shall allow food staff to receive and process online food orders.
- The system shall allow staff to update food order status (Preparing/Ready/Delivered).
- The system shall allow gate staff to scan QR tickets for entry validation.
- The system shall prevent duplicate or invalid ticket usage.
- The system shall allow staff to manage ride capacity and queue control.

4.3 Admin

- The system shall allow admin to log in securely.
- The system shall display real-time crowd and park occupancy.
- The system shall allow admin to add, update or remove rides, events and shops.
- The system shall allow admin to configure ticket prices and discounts.
- The system shall allow admin to manage staff accounts and roles.
- The system shall generate daily, weekly and monthly financial reports.
- The system shall allow admin to approve refunds and cancellations.
- The system shall allow admin to broadcast announcements and alerts.

5. Project basic requirements

5.1 Hardware

Component	Minimum Requirement
Processor	Dual Core 2.0 GHz or higher
RAM	4 GB
Storage	10 GB free disk space
Device	Desktop / Laptop / Tablet / Smartphone
Internet	Stable Internet connection

Table 5.1

5.2 Software

Software	Purpose
Operating System	Windows / Linux / macOS
Frontend	HTML5, CSS3, JavaScript, React.js, Bootstrap / Tailwind CSS
Backend	Node.js, Express.js
Database	MongoDB
Web Server / Runtime	Node.js Server
Local Server / Tools	MongoDB Compass, Postman
Code Editor	Visual Studio Code
Browser	Google Chrome, Mozilla Firefox, Microsoft Edge

Table 5.2

6. Literature review

6.1 Theme Park Management System (Student Project – PHP/MySQL)

This paper presents a basic web-based Theme Park Management System mainly designed to automate ticket generation and visitor record maintenance. The system allows the administrator to manage ticket categories such as adult and child tickets, calculate ticket prices, and generate sales reports for a selected time period. It reduces paperwork, minimizes manual errors, and improves record accuracy. However, the system is limited to admin-only access and does not support advanced features such as online payments, real-time queue tracking, customer dashboards, or smart analytics. It is suitable for small-scale or academic use but lacks scalability for modern theme park operations.

6.2 Digital Queuing in Amusement Parks – Possibilities and Challenges (Master's Thesis)

This research focuses on digital queuing systems and their impact on customer satisfaction in amusement parks. The study highlights that long waiting times are the primary cause of visitor dissatisfaction. Digital queues allow visitors to wait virtually instead of standing in physical lines, thereby reducing stress and improving perceived waiting time. The research also discusses challenges such as fairness perception, system complexity, and user acceptance. The findings show that digital queuing systems are effective when visitor expectations and operational constraints are carefully considered during implementation.

6.3 ParkEase: A Smart Theme Park Management System

This paper proposes a smart and technology-driven theme park management framework using IoT, Artificial Intelligence, and data analytics. The system focuses on real-time crowd monitoring, dynamic ticket pricing, predictive maintenance of rides, and optimized staff allocation. By analyzing visitor movement data, the system can predict congestion and suggest alternative routes or attractions. The paper emphasizes that integrating smart technologies can significantly improve operational efficiency and profitability. However, the proposed system requires advanced infrastructure and higher implementation costs.

6.4 Queue Management in Theme Parks (Peter van Lith)

This paper discusses queue management strategies rather than eliminating queues completely. It explains that since ride capacity is fixed, queues cannot be removed but can be managed by shifting them in time or space. Techniques such as advance booking, virtual queues, and reservation systems are analyzed. The paper also explains that queues contribute to the perceived value of rides and should not be eliminated entirely. The focus is on improving visitor experience by allowing them to use waiting time more productively.

6.5 Continuous Improvement in the Amusement Park Industry (MBA Thesis)

This study applies continuous improvement methodologies such as DMAIC (Define, Measure, Analyze, Improve, Control) to amusement park operations. The research focuses on identifying inefficiencies, reducing waste, and improving internal processes within specific departments such as retail or food services. The structured approach helps improve service quality and operational performance. However, the study does not propose a centralized digital system and focuses more on management practices than on software-based solutions.

6.6 Simulation Applied to Theme Park Management

This paper explores the application of computer simulation models in theme park management. Simulation is used to analyze visitor flow, ride utilization, staff scheduling, and congestion points. The system allows managers to test different scenarios such as peak crowd conditions or staffing changes without affecting real operations. The research highlights that simulation tools are highly useful for decision-making in large theme parks, but they are mainly analytical tools and not direct operational management systems.

6.7 Applications of Operations Research in Theme Parks

This paper reviews the use of operations research techniques to improve theme park efficiency. Methods such as data envelopment analysis are used to evaluate ride performance, staffing efficiency, and resource utilization. The study finds that some ride types are operationally more efficient than others, but also emphasizes that efficiency alone should not be the only factor—customer satisfaction must also be considered. The paper provides useful insights for management decision-making but does not focus on software system implementation.

6.8 Designing the Perfect Queue Line

This research examines how queue line design affects rider satisfaction in theme parks. Based on survey analysis, the study concludes that comfort factors such as shade, temperature control, seating, and accurate wait-time displays are more important than decorative or interactive elements. The paper highlights a strong relationship between queue experience and overall ride satisfaction. It emphasizes that queues should be treated as part of the attraction experience rather than just waiting areas.

7. Project Feasibility Study

7.1 Technical Feasibility:

- The proposed Theme Park Management System is technically feasible as it is developed using modern and widely supported web technologies.
- The frontend of the system is built using HTML, CSS, JavaScript, and Bootstrap to provide a responsive and user-friendly interface.
- Backend functionality is implemented using PHP, which allows efficient server-side processing and system logic handling.
- MySQL is used as the database to store user details, ticket bookings, ride information, food orders, and financial data in a structured manner.
- QR-code generation and scanning are supported using existing libraries for secure ticket validation.
- Real-time queue status and estimated waiting time are handled using database updates and server-side logic.
- Online payment integration is supported through existing payment gateway APIs.
- The system can run on standard web servers such as Apache using XAMPP or WAMP.
- Development tools like Visual Studio Code, XAMPP, phpMyAdmin, and Git are easily available and commonly used.
- Developers require basic knowledge of PHP, MySQL, JavaScript, and web development, making the system technically achievable.
- Therefore, the proposed system can be successfully developed and deployed using available technical resources.

7.2 Operational Feasibility:

- The system is operationally feasible as it automates and simplifies daily theme park operations.
- Customers can register, view rides, check real-time queue status, book tickets online, order food, and track booking history easily.
- Staff members can manage ride operations, scan QR-code tickets, and receive online food orders through role-based access.
- Admin users can manage rides, events, shops, pricing, discounts, and monitor real-time crowd levels.
- The system improves coordination between different park departments and reduces manual work.
- The user interface is simple and easy to understand, so minimal training is required.
- The system reduces paperwork, human errors, and processing time.
- Hence, the proposed system is operationally feasible and supports smooth theme park operations.

7.3 Economic Feasibility:

- The proposed system is economically feasible as it is developed using open-source and freely available technologies.
- PHP, MySQL, HTML, CSS, JavaScript, and Bootstrap do not require any licensing costs.
- Development and testing can be done using standard computers and software tools without extra hardware investment.QR-code and payment gateway integration do not require costly infrastructure.
- Deployment and maintenance costs are low, making the system affordable for small and large theme parks.
- The system helps reduce operational costs by minimizing manual work and improving resource utilization.
- Therefore, the Theme Park Management System is considered economically feasible with minimal development and operational expenses.

8. Project Requirement Gathering

8.1 Requirement Gathering Techniques for the Theme Park Management System

- Observation of real-world theme park activities such as ticket booking, entry management, ride operations, queue handling, food ordering, and staff coordination to understand daily park workflows and challenges.
- Study of existing theme park and amusement park management systems to identify common features, limitations, inefficiencies, and missing functionalities.
- Role analysis of different system users including Customers, Staff, Admin sto define responsibilities, access levels, and system interactions.
- Functional requirement analysis to identify essential operations such as user registration, online ticket booking, QR-code validation, real-time queue monitoring, ride management, food ordering, and feedback handling.
- Interviews and feedback discussions with visitors, park staff, and management to understand practical needs and user expectations.
- Review of park-related documents such as ticket pricing rules, ride capacity limits, safety guidelines, staff duty schedules, and discount policies to ensure correctness and compliance.
- Analysis of visitor expectations related to reduced waiting time, real-time ride information, easy booking, cashless payments, and smooth park experience.
- Analysis of system scalability and integration needs to support future features such as mobile application support, smart queue systems, advanced analytics, and integration with payment and notification services.

8.2 Comparison of Existing Applications with your Application

Feature	Existing Theme Park Systems	Theme Park Management System (TPMS)
User Access	Limited access for visitors and staff	Separate access for Customers, Staff, Admin
Ticket Booking	Offline or basic online booking	Online ticket booking with QR-based e-tickets
Queue Management	Manual queues or estimated timings	Real-time queue status and estimated waiting time
Ride Management	Manual ride control and updates	Digital ride status management (ON/OFF/Maintenance)
Food Ordering	Offline food counters only	Online food ordering with order tracking
Entry Validation	Manual ticket checking	QR-code scanning for secure entry
Staff Management	Paper-based or manual scheduling	Role-based staff access and task handling
Customer Feedback	Verbal or paper feedback	Digital feedback and rating system
Transparency	Low transparency in operations	High transparency for bookings and queues
Data Security	Basic security measures	Secure login and role-based access control
Decision Support	No analytical support	Data-based insights for better park management

Table 8.1

9. Project Timeline chart

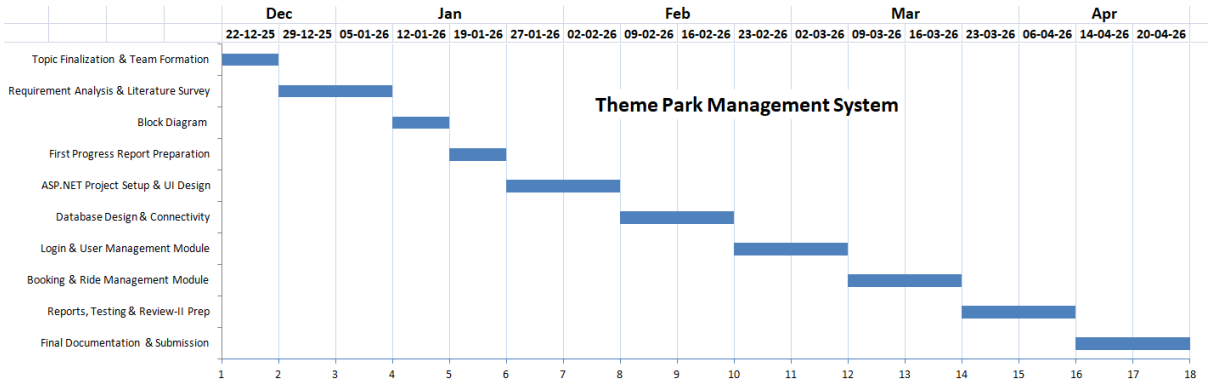

Fig 9.1

10.Project work distribution among team members

Team Member	Responsibility
23IT438	Customer Module, Online Ticket Booking, Booking History, Feedback Module
23IT447	Staff Module, Ride Management, QR-Code Scanning, Food Order Handling
23IT449	Admin Module, System Integration, Database Management, Reports & Analytics

Guide
Remark/Suggestions

Guide Signature
with Date