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A Case Study on

Theme Park and Resort Management System

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IsDB-BISEW IT Scholarship Programme

Date of Submission: **28th December 2025**

Comprehensive Case Study on

Theme Park and Resort Management System

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1. Executive Summary

Comprehensive Case Study on TPRMS: Theme Park and Resort Management System

"TPRMS" is an integrated enterprise resource planning (ERP) solution designed to streamline the complex operations of a modern entertainment complex that includes a theme park, resort, zoo, and various commercial units. Unlike traditional fragmented systems, TPRMS unifies visitor management, asset maintenance, payroll, and multi-stream revenue tracking into a single cohesive platform. This case study explores the robust database architecture of TPRMS, its specialized modules for different business units (Zoo, Resort, Sales), and the automated financial logic underpinning its success.

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2. Objective

The primary goal of TPRMS is to provide a centralized platform for operational efficiency and profit maximization, ensuring:

1. **Seamless Visitor Experience:** From ticketing to resort check-in and dining.
2. **Asset Reliability:** Automated tracking of ride maintenance and safety inspections.
3. **Financial Transparency:** Real-time consolidation of revenue from tickets, shops, dining, and agricultural sales (Fish/Fruit).
4. **Workforce Optimization:** Precise tracking of employee shifts, attendance, and payroll.

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3. Database Design Overview

TPRMS uses Microsoft SQL Server as its relational database backend, featuring a highly normalized schema to handle diverse data types ranging from hotel bookings to animal health records.

3.1 Schema Features

1. **Normalized Tables:** Structured to separate distinct entities like Resort, Zoo, Employees, and FinancialTransactions to minimize redundancy.
2. **Data Integrity:** Extensive use of Constraints (Check, Default, Foreign Key) to ensure valid data entry (e.g., ensuring CheckOutDate > CheckInDate).
3. **Automation:** Heavy reliance on **Triggers** to automate stock updates, financial logging, and revenue summarization.

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4. Key Modules and Their Functionalities

The database is organized into five core functional domains:

4.1 Administration & Human Resources

- **Tables Involved:** Employees, EmployeeSalaryGrade, EmployeePayment, AttendanceStaffShift, Payroll.

- **Key Features:**
    - Detailed employee profiles including role, department, and shift schedules.
    - Automated net salary calculation based on basic salary, bonuses, and grade-based allowances (fn_CalculateEmployeeNetSalary).
    - Shift management tracking total hours worked and attendance status (Present, Late, Absent).

4.2 Park Operations & Asset Management

- **Tables Involved:** Park, PlaygroundFacilities, MaintenanceLog, WaterBalloonWalks, FerrisWheel, HorseRides, BoatRides.
- **Key Features:**
    - Lifecycle management of rides and facilities.
    - MaintenanceLog tracks issues, costs, and technician assignments to ensure safety.
    - Capacity management for parking areas and specific rides.

4.3 Resort & Hospitality Management

- **Tables Involved:** Resort, ResortRoom, ResortBookings, ResortDining, ResortKitchen.
- **Key Features:**
    - **Room Management:** Real-time status updates (Available, Booked, Cleaning) automated via triggers (trg_UpdateRoomStatus).
    - **Dining:** Integrated food and beverage ordering linked to visitor IDs and rooms.
    - **Kitchen Inventory:** Tracking stock levels and cuisine types for resort kitchens.

4.4 Commercial & Revenue Management

- **Tables Involved:** TicketSales, ShopSales, FishSales, FruitSales, FinancialTransactions, RevenueSummary.
- **Key Features:**
    - **Multi-Source Revenue:** Consolidates income from diverse sources (Tickets, Souvenirs, Dining, and even agricultural produce like Fish/Fruit) into a central FinancialTransactions table.
    - **Inventory Control:** Automated stock deduction triggers (trg_UpdateStock_AfterSale) prevent overselling in shops.

4.5 Zoo & Ecological Management

- **Tables Involved:** Zoo, Enclosure, Animal, AnimalMedicalHistory, PlantSpecies.
- **Key Features:**
    - Tracking animal health, diet types, and vaccination history.
    - Managing botanical assets like flower gardens and fruit orchards.

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5. Challenges and Solutions

5.1 Challenges in the Market

Theme parks often face "Data Silos" where the hotel system doesn't talk to the ticketing system, and the zoo operations are manual paper records.

- **Problem:** Fragmented revenue data makes it hard to see daily profit.
- **Impact:** Financial leakage and inability to track which attraction is most profitable.

- **Problem:** Maintenance scheduling is reactive rather than proactive.

- **Impact:** Ride breakdowns cause visitor dissatisfaction and safety risks.

5.2 How TPRMS Solves These Problems

1. **Centralized Financial Logging:**
    - *Solution:* Use of a central FinancialTransactions table.
    - *Benefit:* Whether a guest buys a ticket, orders dinner, or buys a souvenir, the transaction is instantly logged in one place for real-time reporting.
2. **Automated Maintenance:**
    - *Solution:* The MaintenanceLog table tracks inspection dates and statuses.
    - *Benefit:* Ensures rides like the Ferris Wheel are inspected on schedule, reducing downtime.
3. **Ecological Revenue Streams:**
    - *Solution:* Dedicated modules for FishFarms and FruitGardens.
    - *Benefit:* Turns park landscaping and water bodies into revenue-generating assets, tracked alongside standard sales.

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6. Innovations

1. **Trigger-Based Financial Automation:**
    - Triggers like trg_LogTicketSales_Income and trg_LogShopSales_Income automatically populate the financial ledger, eliminating manual data entry errors.
2. **Dynamic Revenue Summarization:**
    - The trg_MaintainRevenueSummary trigger updates the RevenueSummary table instantly upon any transaction, providing a live "Dashboard View" of Net Revenue (Income - Expense).
3. **Integrated Agro-Tourism:**
    - Unique support for managing and selling produce from Fish Farms and Fruit Gardens, blending eco-tourism with standard theme park features.

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7. Reports and Analytics

Using the specialized Functions and Views created in the system:

1. **Financial Health:** fn_GetTotalRevenueBySource provides a breakdown of income from Tickets vs. Shops vs. Dining vs. Agriculture.
2. **Staff Efficiency:** fn_GetParkAttendanceSummary gives immediate insight into workforce availability.
3. **Asset Status:** Views like vw_AssetMaintenanceSummary combine data from Rides, Resorts, and Zoo enclosures to show operational readiness at a glance.

8. Developer Benefits (Commercial Potential)

As the developer of TPRMS, you have significant monetization opportunities:

1. **SaaS Licensing:** License the software to other resorts or amusement parks on a monthly subscription basis.
2. **Modular Sales:** Sell the "Zoo Management" module separately to standalone zoos or the "Resort" module to hotels.
3. **Customization Services:** Charge for tailoring the specific ride types or adding new revenue streams (e.g., Spa/Gym) for different clients.

Module 1: Core Administration & Human Resources

This module acts as the "brain" of the organization, managing the facility's identity and its workforce.

1. Park

- **Description:** The root table storing global configuration data for the entire complex (e.g., Opening Time, Entry Fee, Total Capacity).
- **Why it is needed:** In real life, management needs a single place to change global rules. If the park changes its opening time from 9 AM to 10 AM, you update this one record instead of changing code everywhere. It also tracks the total number of facilities (Resorts, Rides) for reporting.

2. Employees

- **Description:** Stores personal and professional details of all staff, from managers to gardeners. It includes strict constraints like CHECK (Age >= 18) to ensure legal compliance.
- **Why it is needed:** You cannot run a secure facility without knowing exactly who is on-site. This table links every action (selling a ticket, cleaning a room, feeding a tiger) to a specific person for accountability.

3. EmployeeSalaryGrade

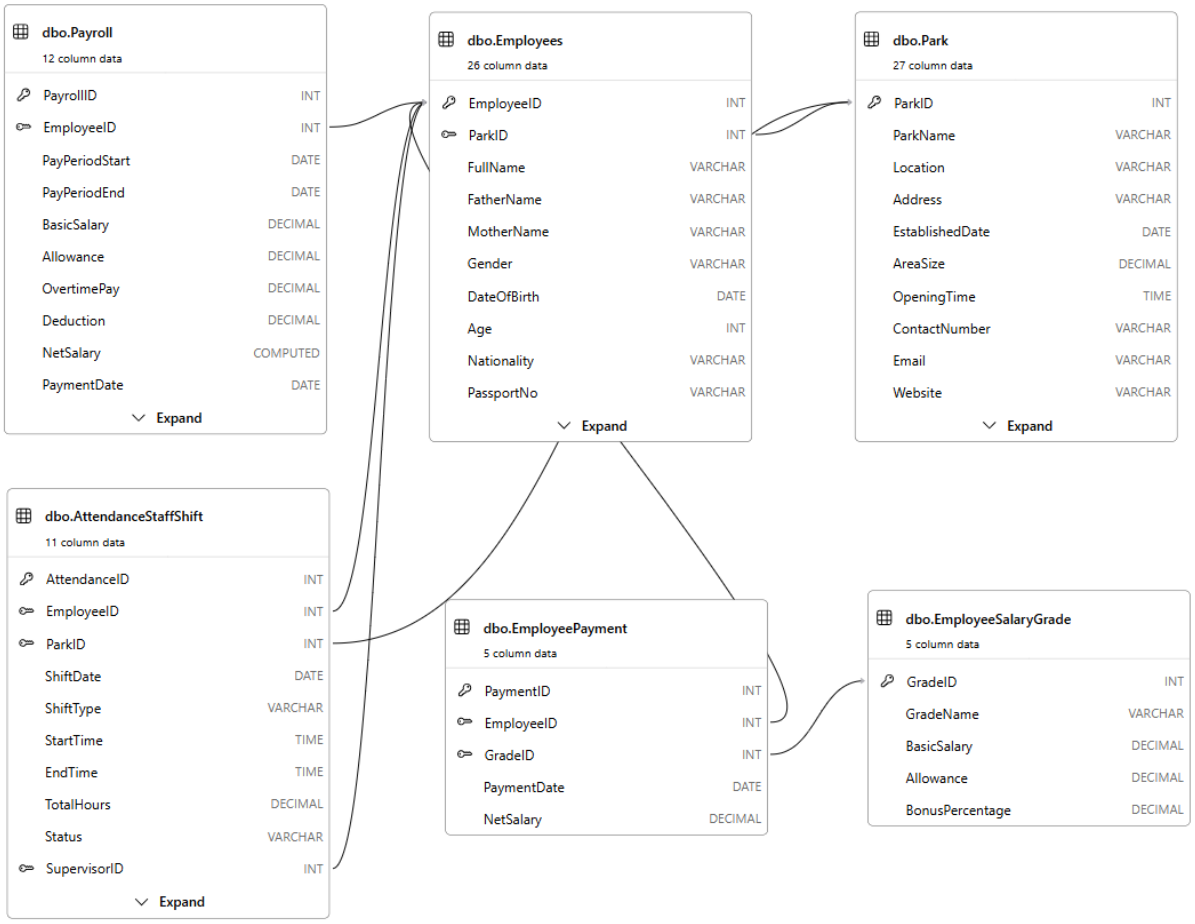
- **Description:** Defines standardized pay scales (Grade A, B, C) with associated Basic Salary, Allowances, and Bonuses.
- **Why it is needed:** Large organizations do not negotiate salary individually for every guard or cleaner. They use pay grades. This table simplifies payroll updates—if "Grade C" gets a raise, everyone in that grade gets updated automatically.

4. EmployeePayment & Payroll

- **Description:** Tracks the actual monthly salary transactions (NetSalary) and detailed breakdowns (Basic + Overtime - Deductions).
- **Why it is needed:** Legally, businesses must prove they paid their staff. These tables serve as the financial ledger for HR, preventing disputes over unpaid overtime or missed bonuses.

5. AttendanceStaffShift

- **Description:** Logs daily clock-in/clock-out times, shift types (Morning/Evening), and statuses (Present/Late/Absent).
- **Why it is needed:** To calculate overtime or deduct pay for lateness. In a 24/7 resort, you need to ensure every shift (especially night security) is covered.



Module 2: Resort & Hospitality Management

This module manages the hotel side of the business, handling bookings, housekeeping, and dining.

6. Resort

- **Description:** Represents the different hotel branches or buildings within the park (e.g., "Main Resort", "Beachside Villas").
- **Why it is needed:** The complex may have multiple hotels with different managers and policies. This table separates them logically.

7. ResortRoom

- **Description:** The inventory of sellable units. Tracks RoomNumber, Type (Suite/Deluxe), and critically, AvailabilityStatus.
- **Why it is needed:** The front desk cannot sell a room if they don't know if it's clean or occupied. The AvailabilityStatus column prevents double-booking.

8. ResortBookings

- **Description:** Links a Visitor to a Room for a specific date range. It tracks CheckIn, CheckOut, and PaymentStatus.

- **Why it is needed:** This is the core revenue driver for the hotel. It provides the legal contract between the guest and the hotel and is used to forecast occupancy rates.

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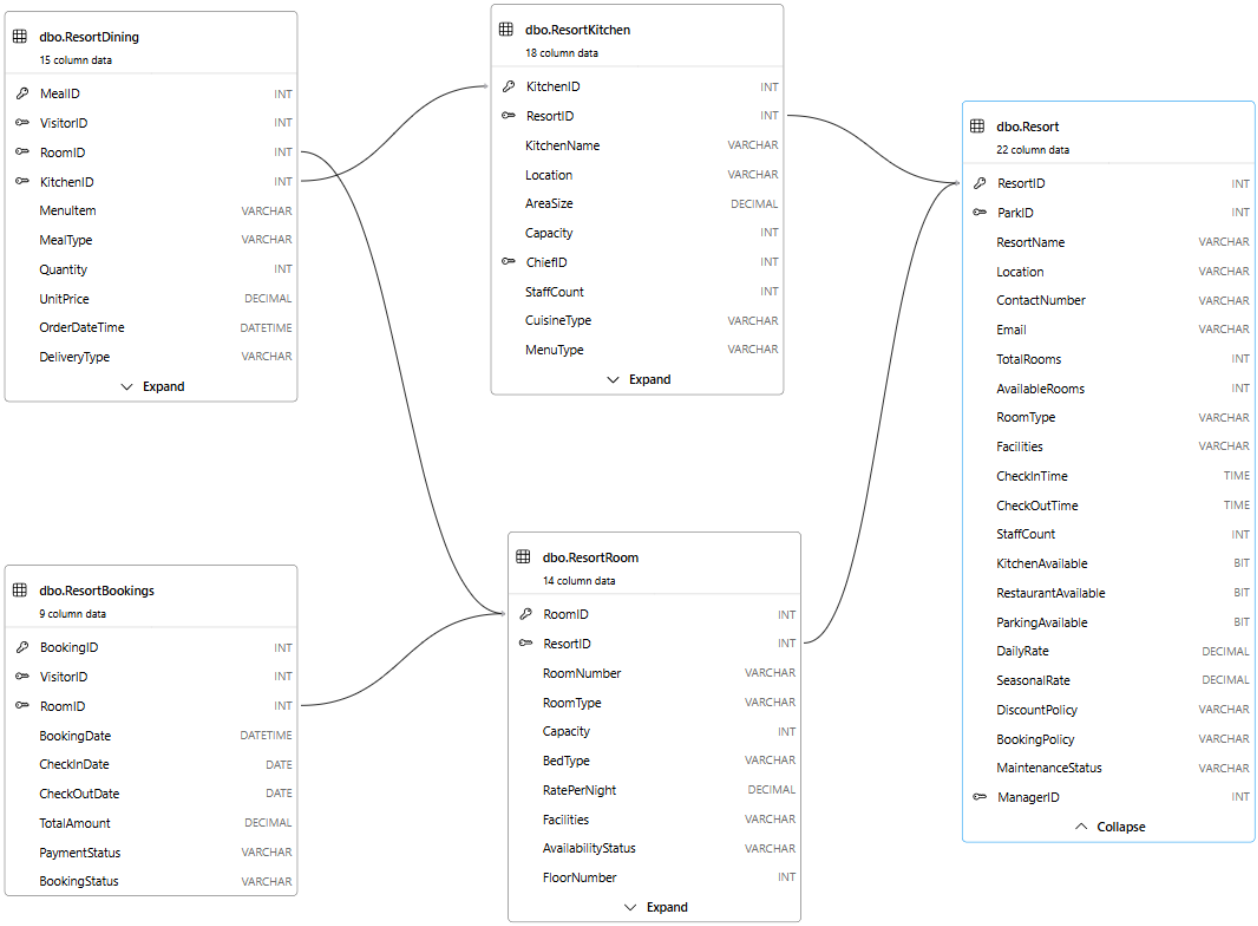
9. ResortKitchen

- **Description:** Manages the food production areas (e.g., "Main Kitchen", "Pastry Section") including their CuisineType and ChiefID.
- **Why it is needed:** In a large resort, you send a pizza order to the Italian Kitchen, not the Bakery. This table routes orders correctly.

10. ResortDining

- **Description:** Records individual food orders (MealID, MenuItem) linked to a visitor or a room.
- **Why it is needed:** To bill guests correctly. If a guest orders room service, this table ensures the cost is added to their final checkout bill or paid immediately.



Module 3: Commercial Operations (Sales & Inventory)

This module tracks money coming in from retail and general park sales.

11. Shop

- **Description:** Defines retail outlets (Souvenir stores, Grocery, Food Courts) and their managers.

12. Vendors & Products & VendorProducts

- **Description:** A standard inventory system. Vendors supply the goods; Products lists what is for sale (stock levels, price); VendorProducts handles multiple suppliers for one item.
- **Why it is needed:** To prevent running out of stock. You need to know who to call (Vendor) when StockQuantity hits the ReorderLevel.

13. ShopSales

- **Description:** The transaction log for every item sold in a shop.
- **Why it is needed:** This is the cash register tape. It triggers inventory deduction and financial logging.

14. TicketSales

- **Description:** Logs entry passes sold to visitors.
- **Why it is needed:** The primary revenue source for the park. It helps analyze peak visiting hours

15. FinancialTransactions & RevenueSummary

- **Description:**
  - FinancialTransactions: A central ledger recording *every* penny (Income or Expense) from all modules.
  - RevenueSummary: A snapshot table for quick dashboard reporting.
- **Why it is needed: Auditing.** Instead of checking 10 different tables (ShopSales, TicketSales, Dining) to find total daily profit, the owner checks FinancialTransactions.

Module 4: Park Operations & Attractions

This module manages the entertainment assets and visitor facilities.

16. Visitors

- **Description:** CRM data—Visitor names, types (Family/Corporate), and contact info.
- **Why it is needed:** For marketing and security. If a child is lost, you look up the parent's contact info here.

17. ParkingArea

- **Description:** Manages capacity and revenue for car/bus parking zones.
- **Why it is needed:** Parking is often a bottleneck. Knowing AvailableSlots helps security direct traffic efficiently.

18. PlaygroundFacilities & Rides (FerrisWheel, WaterBalloonWalks, BoatRides, etc.)

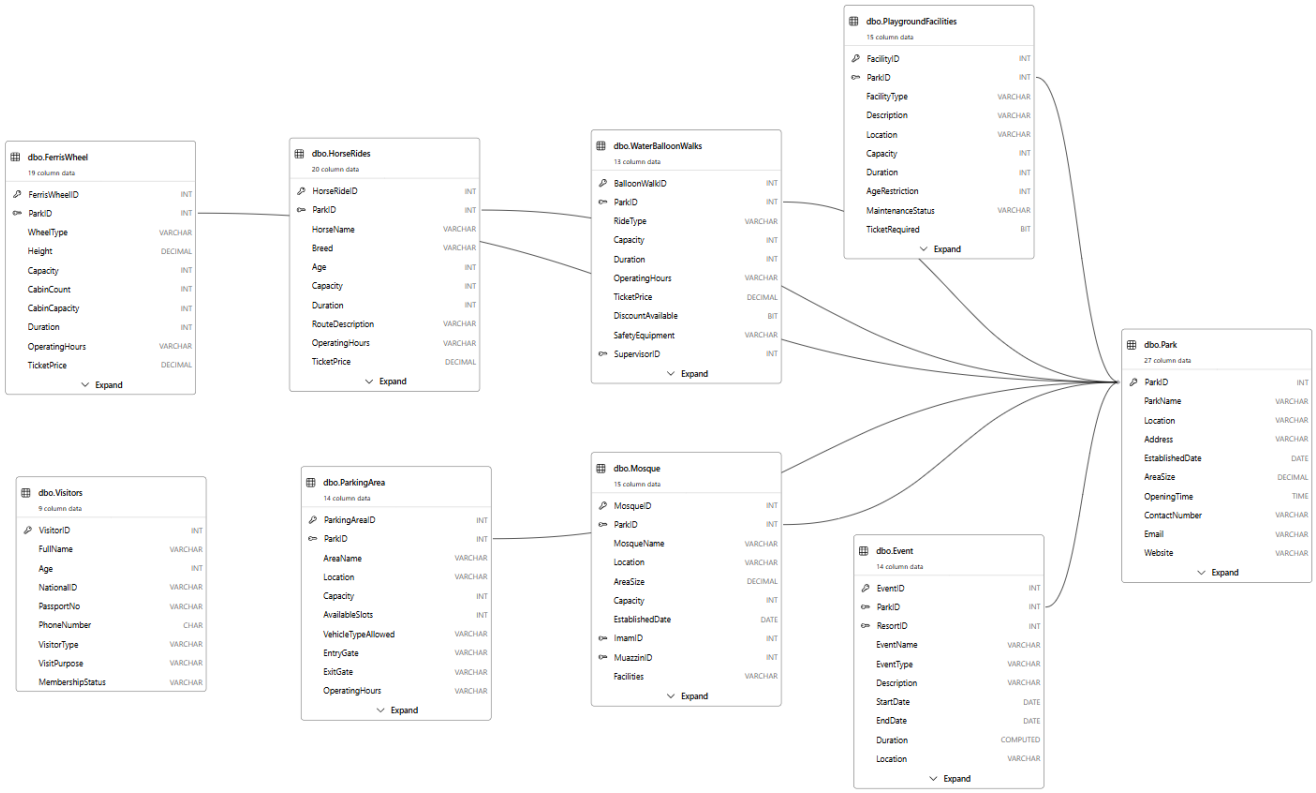
- **Description:** Distinct tables for different attraction types, tracking Capacity, TicketPrice, and MaintenanceStatus.
- **Why it is needed:** Each ride has unique safety parameters. A Ferris Wheel needs specific inspection logs different from a Boat Ride. Separation allows specific attribute tracking.

19. Event

- **Description:** Manages concerts, weddings, or corporate retreats hosted at the park.
- **Why it is needed:** Events bring huge revenue but disrupt normal operations. This table helps schedule staff and close off areas needed for private functions.

20. Mosque

- **Description:** Manages prayer facilities, Imam assignments, and capacity.
- **Why it is needed:** Essential facility management to ensure visitor comfort and religious accommodation.



Module 5: Ecological & Agro-Management

A unique feature of this TPRMS is the management of living assets (Zoo) and production units (Farms).

21. Zoo, Enclosure, Animal

- **Description:**
  - Zoo: General sections (Safari, Aviary).
  - Enclosure: Physical cages/habitats (Lion Den, Aquarium).
  - Animal: Individual health records, diet, and origin.
- **Why it is needed:** Animals are high-maintenance assets. You need to know which enclosure a tiger is in and when it was last fed to ensure safety and animal welfare.

22. AnimalMedicalHistory

- **Description:** Vet logs for treatments and checkups.
- **Why it is needed:** Compliance and health tracking. If an epidemic breaks out, you can trace patient zero using these logs.

23. FishFarms & FishSales

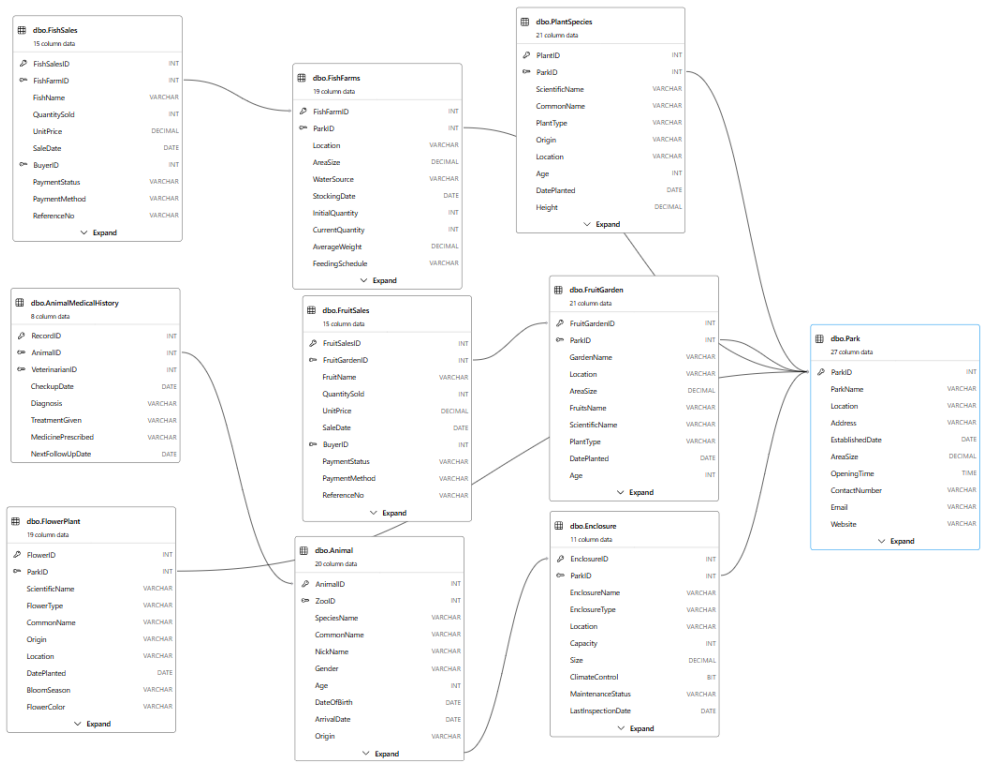
- **Description:** Tracks aquaculture production (ponds, stock) and bulk sales to buyers.
- **Why it is needed:** Treats the park's water bodies as revenue generators. It tracks harvest cycles separate from standard retail.

24. FruitGarden & FruitSales

- **Description:** Manages orchards (Mango, Litchi) and the sale of harvest.
- **Why it is needed:** Tracks agricultural yield. This allows the park to sell produce commercially to wholesalers (Buyer table).

25. PlantSpecies & FlowerPlant

- **Description:** Botanical databases for the park's gardens.
- **Why it is needed:** For landscaping maintenance. Gardeners need to know watering schedules (WateringSchedule) for specific exotic plants.



Module 6: Maintenance, Safety & Feedback

This module handles risk management and quality control.

26. MaintenanceLog

- **Description:** Records every repair job on rides or facilities (IssueDescription, Cost, TechnicianID).
- **Why it is needed: Safety Critical.** If a ride malfunctions, legal authorities will check this log to see if maintenance was performed on time.

27. IncidentReport

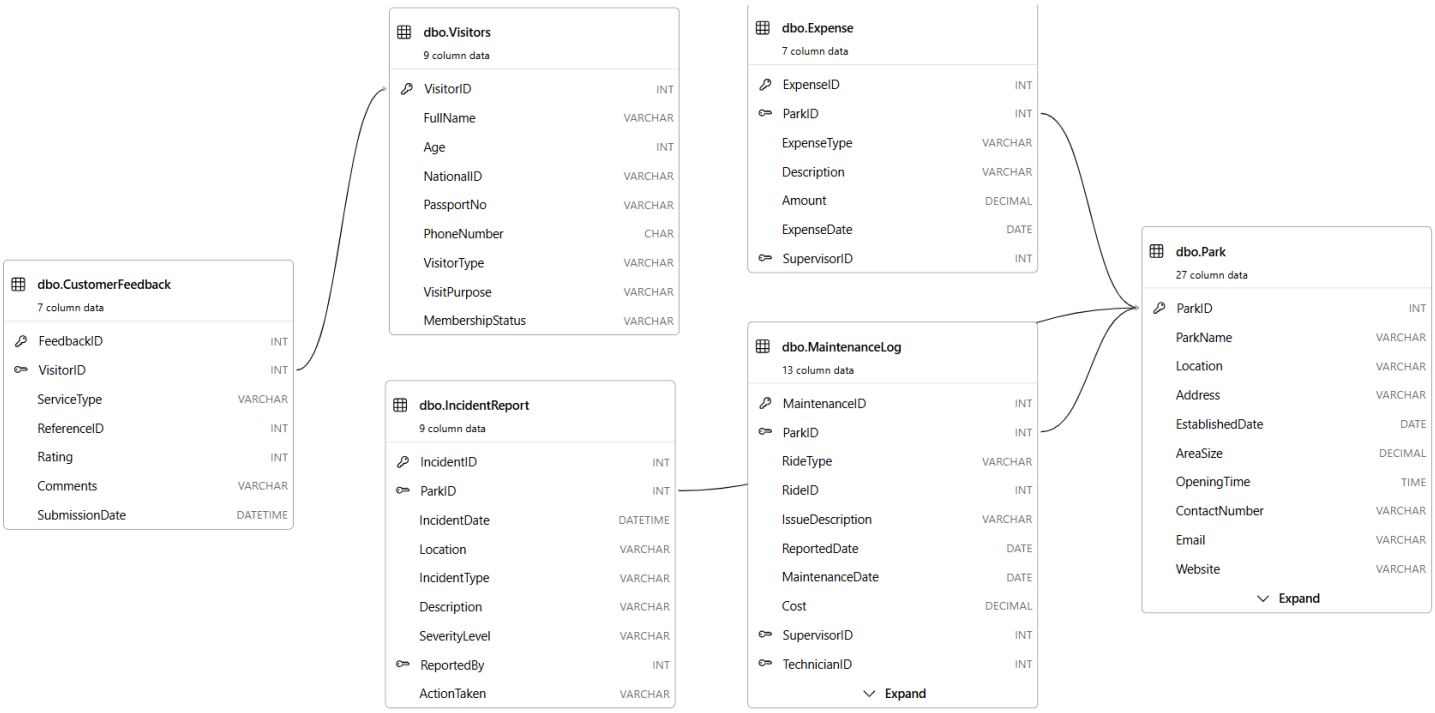
- **Description:** Logs accidents, thefts, or medical emergencies.
- **Why it is needed:** Legal protection and pattern analysis. If accidents happen frequently at the "Water Slide," management knows it needs redesigning.

28. CustomerFeedback

- **Description:** Stores visitor ratings and comments.
- **Why it is needed:** Quality assurance. Low ratings trigger management reviews of specific services (e.g., "Food was cold").

29. Expense

- **Description:** Tracks operational costs (electricity, animal feed, spare parts).
- **Why it is needed:** To calculate Net Profit. Revenue - Expense = Profit. Without this, you only know how much money you made, not how much you kept.



Section 30: Project Conclusion and Future Scope

30.1 Project Conclusion: Realizing a Unified Enterprise Platform

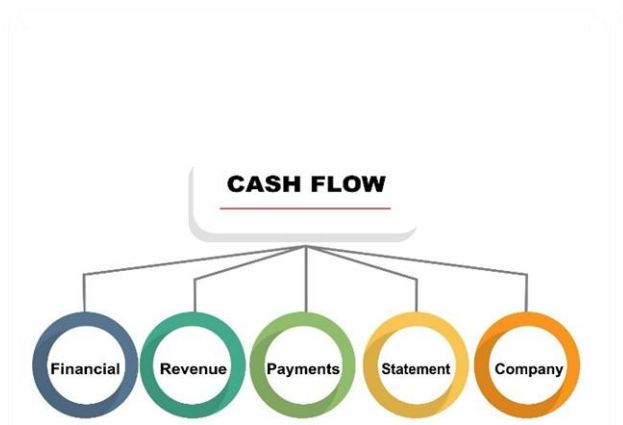
The Theme Park and Resort Management System (TPRMS) project has successfully transitioned from a complex conceptual requirement into a robust, high-performance relational database solution built on Microsoft SQL Server. The primary objective—to create a single, cohesive Enterprise Resource Planning (ERP) platform for a multi-faceted entertainment complex—has been fully realized.

The core challenge addressed by TPRMS was the fragmentation inherent in managing diverse operational units: hospitality, human resources, retail, specialized attractions, and unique ecological assets (Zoo, Farms). By adopting a highly normalized, modular database design, TPRMS eliminates data silos, ensures data consistency, and provides a singular source of truth for all business intelligence and auditing needs.

Structural Integrity and Architectural Success

The system is architected around six self-contained yet fully integrated modules, each designed to manage specific business functions while adhering to park-wide standards defined in the root **Park** configuration table. This architecture, comprising 29 distinct tables, is the project's most significant achievement:

1. **Core Administration & HR (Module 1):** Successfully implements essential workforce management, linking employees to strict legal compliance checks (CHECK (Age >= 18)) and utilizing the **EmployeeSalaryGrade** lookup table to standardize pay. The payroll process is streamlined by directly integrating **AttendanceStaffShift** data into the final **EmployeePayment** generation.
2. **Financial and Commercial Consolidation (Module 3):** This module's success lies in its absolute transparency. All revenue streams—from **TicketSales** and **ShopSales** to **ResortDining**—are mandated to feed into the central **FinancialTransactions** ledger. This allows management to instantly calculate Net Profit (Revenue - Expense = Profit) without cross-referencing disparate systems, fulfilling a critical auditing requirement.



3. **Specialized Asset Management (Module 5):** The system goes beyond typical resort management by incorporating specialized modules for living assets. The detailed hierarchy connecting **Zoo** sections, **Enclosure** locations, and individual **Animal** health records, along with dedicated tracking for **FishFarms** and **FruitGarden** yields, demonstrates the database's unique flexibility and comprehensive scope.

Enforcement of Business Logic and Data Reliability

The physical implementation validates the logical design through the rigorous use of constraints and custom code:

- **Referential Integrity:** The implementation of **Foreign Keys** across all modules successfully prevents orphaned data (e.g., ensuring a ResortBookings record always references a valid Visitor and ResortRoom), maintaining the integrity of all transactional relationships.
- **Programmability (SPs and UDFs):** Complex business logic is abstracted into secure, high-performance objects. Stored Procedures, such as those for handling room bookings, ensure multi-step operations execute atomically. User-Defined Functions, like **fn_CalculateNetSalary**, guarantee that intricate calculations (Basic + Bonus + Annual Allowance) are performed consistently across all reports and transactions, reducing human error in a safety-critical function like payroll.
- **Views for Reporting:** The creation of views (e.g., vw_EmployeePayrollDetails) simplifies data retrieval for end-users and BI tools. These virtual tables provide secure, clean access to consolidated data without exposing the underlying complex schema.

30.2 Future Enhancements and Scalability

While the TPRMS database is fully functional and ready for deployment, its architecture is designed for future growth, supporting several key enhancements that will further optimize operations and visitor experience:

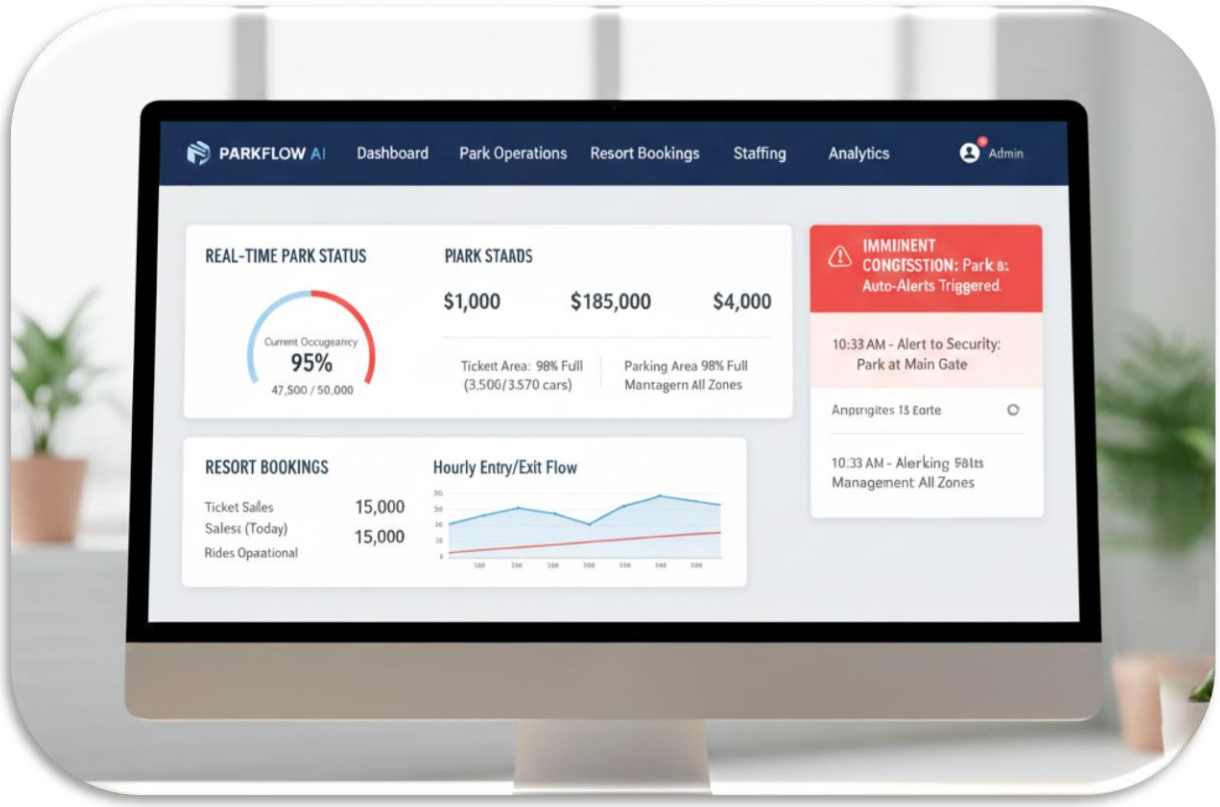
A. Operational Efficiency and Automation

- **Real-time IoT Integration for Maintenance (Module 6):** Future enhancements will integrate Internet of Things (IoT) sensors on major attractions (e.g., **Rides**). These sensors could feed data directly into the system, automatically generating a high-priority entry in the **MaintenanceLog** when parameters like vibration, temperature, or current consumption exceed safe thresholds, shifting the system from reactive to proactive safety management.
- **Dynamic Pricing Engine:** Leveraging historical data from **TicketSales** and **ResortBookings**, the system can be enhanced with machine learning models to predict peak demand. This engine could feed dynamic pricing recommendations back to the application layer, maximizing revenue during high-occupancy periods.

B. User Experience and Accessibility

- **Public API Layer Integration:** The existing data structure is ideal for supporting external applications. A dedicated API can be built on top of the reporting Views to securely handle mobile application requests for features such as:
    - **Visitor** self-registration and profile updates.
    - Real-time room availability checks (**ResortRoom**).
    - Event schedule lookup (**Event**).

- **Visitor Flow and Capacity Management:** By linking real-time entry/exit data from **TicketSales** and **ParkingArea** to the **Park**'s total capacity, a feature could be developed to automatically trigger alerts to security and management when congestion limits are approached, improving safety and traffic flow.



C. Maintenance and Security Hardening

- **Advanced Auditing and Change Tracking:** Implementation of system-level audit features or triggers on sensitive tables (**Employees**, **FinancialTransactions**) will log every data modification (who, when, and what changed), providing an immutable history essential for regulatory compliance.

- **Automated Index Maintenance:** While appropriate indexes have been created (as documented in the DDL), future maintenance scripts can be scheduled to automatically rebuild or reorganize indexes, ensuring long-term query performance and minimizing system latency as the data volume grows.

In conclusion, the TPRMS database project represents a successful merger of strong theoretical design principles and practical, production-ready SQL implementation. It provides the Theme Park management with the unified, transparent, and scalable platform required to thrive in a highly competitive and complex business environment.