

# **CS2005: Database Systems (Spring 2025)**

## **Semester Project**

### **Project groups:**

This project can be done within a group of two or three (2/3) students. There is no restriction on the selection of group members. Students are allowed to make groups according to their preferences with their sections. Cross-section groups are not allowed.

### **Submission:**

- All submissions **MUST** be uploaded on Google Classroom. Solutions sent to the emails will not be graded.
- To avoid last-minute problems (unavailability of Google Classroom, load shedding, network down, etc.), you are strongly advised to start working on the project from day one.
- You are required to use Visual Studio 19 or above and SQL Server for the project.
- Combine all your work in one file named `ROLL_NUM_DB_P` (e.g., `20i-1234_DB_P.zip`).
- **SUBMIT COMPLETE PROJECT.** Submit the .zip file in the classroom within a given deadline. Failure to submit according to the above format would result in **ZERO** marks.

### **Deadlines**

- **Milestone-1:** Submission of ERD, Relational model and Initial database with all the tables, their relations and insertions :**19 April 2025 (Saturday)**
- **Milestone-2:** Interfaces of the complete project – **2<sup>nd</sup> May 2025 (Saturday)**
- **Milestone-3:** Complete project including Database integrated with the frontend– **9<sup>th</sup> May 2025 (Friday)**

**Plagiarism: ZERO marks** will be awarded if any significant part of the project is found plagiarized.

## **Project Name: "TravelEase" – Comprehensive Travel Management Platform**

**Overview:** TravelEase is a centralized platform for planning, booking, and managing travel experiences. It connects travelers, tour operators, hotels, local guides, and transport providers, focusing on trip customization, booking management, resource coordination, payments, and reviews. The platform supports diverse travel types (adventure, cultural, leisure) and caters to solo travelers, groups, and corporate trips.

### **Key Components and Interfaces:**

#### **1. Traveler Interface:**

- **Registration and Login:** Secure sign-up with personal details.
- **Trip Search and Booking:** Filter trips by destination, date, price range, activity type (e.g., hiking, cultural tours), and group size. Book trips or accommodations.
- **Trip Dashboard:** View upcoming trips, itineraries, booking confirmations, and cancellation policies.
- **Digital Travel Pass:** Access e-tickets, hotel vouchers, and activity passes.
- **Reviews and Ratings:** Rate trips and accommodations.
- **Profile Management:** Update preferences and view travel history.

#### **2. Tour Operator Interface:**

- **Operator Registration and Login:** Create profile (company info).
- **Trip Creation and Management:** Design, update and delete trips with appropriate information such as itineraries, pricing, inclusions (meals, guides), duration and capacity limits.
- **Trips Listing:** Operator must be able to view and edit all the existing trips by them.
- **Resource Coordination:** Assign services and hotels to the travelers.
- **Booking Management:** Track reservations, send reminders, and handle cancellations/refunds.
- **Performance Analytics:** View booking rates, revenue, and review summaries.

#### **3. Admin Interface:**

- **User and Operator Management:** Approve/reject all users registrations.
- **Tour Categories Management:** Oversee tour categories.
- **Platform Analytics:** Monitor user traffic, booking trends and revenue generated.
- **Review Moderation:** Filter inappropriate reviews.

#### **4. Hotel/Service Provider Interface:**

- **Service Integration:** Hotel/Services assigned by the operator to the traveler should be accepted/rejected by the hotel/service provider.
- **Service Listing:** You should be able to list and manage all the services/hotels you provide.

- **Booking Management:** Confirm traveler reservations made through the operator, update room/seat availability, and track payments.
- **Performance Reports:** Analyze occupancy rates, traveler feedback, and revenue.

## **Reports to design for the system**

### **1. Trip Booking and Revenue Report**

- **Description:** Tracks booking trends and financial performance across trips.
- **Key Metrics:**

- Total Bookings: Number of confirmed bookings.
- Revenue by Category: Earnings categorized by Trip Type (adventure, cultural, leisure, etc), Capacity (solo or group), Duration (1-Day, 4-Day).
- Cancellation Rate: Percentage of canceled bookings.
- Peak Booking Periods: Months/days with the highest demand.
- Average Booking Value: Revenue per booking.

**Purpose:** Identify top-performing trips, optimize pricing, and reduce cancellations.

**Visualization:** Deploy appropriate graphs (bar/pie chart) to visualize the reports.

### **2. Traveler Demographics and Preferences Report**

- **Description:** Analyzes traveler profiles to tailor marketing and trip recommendations.

- **Key Metrics:**

- Age and Nationality Distribution: Demographics of users.
- Preferred Trip Types/Destinations: Most-booked categories (e.g., hiking, luxury tours) or destinations.
- Spending Habits: Average budget per traveler.

**Purpose:** Personalize user experiences and target underserved demographics.

**Visualization:** Deploy appropriate graphs (bar/pie chart) to visualize the reports.

### **3. Tour Operator Performance Report**

- **Description:** Evaluates tour operators based on traveler feedback and sales.

- **Key Metrics:**

- Average Operator Rating: Aggregated traveler reviews (1- 5 stars).
- Revenue per Operator: Total earnings from their trips.
- Response Time: Speed of addressing traveler inquiries (Calculated through responding time – ticket generation time).

**Purpose:** Reward top operators and improve underperforming partnerships.

**Visualization:** Deploy appropriate graphs (bar/pie chart) to visualize the reports.

### **4. Service Provider Efficiency Report**

- **Description:** Measures performance of hotels, guides, and transport services.

- **Key Metrics:**

- Hotel Occupancy Rate: Percentage of booked rooms.

- Guide Ratings: Average feedback scores from travelers.
- Transport On-Time Performance: Punctuality of buses, flights, etc.

**Purpose:** Ensure reliable service quality and highlight top providers.

**Visualization:** Deploy appropriate graphs (bar/pie chart) to visualize the reports.

## 5. Destination Popularity Report

- **Description:** Highlights trending destinations and traveler satisfaction.

- **Key Metrics:**

- Most-Booked Destinations: Cities/regions with highest bookings.
- Seasonal Trends: Demand fluctuations by month/season.
- Traveler Satisfaction Score: Average ratings per destination.
- Emerging Destinations: Locations with growing interest.

**Purpose:** Optimize marketing and expand offerings in high-demand areas.

**Visualization:** Deploy appropriate graphs (bar/pie chart) to visualize the reports.

## 6. Abandoned Booking Analysis Report

- **Description:** Investigates incomplete bookings to reduce revenue loss.

- **Key Metrics:**

- Abandonment Rate: Percentage of uncompleted bookings.
- Common Reasons: Payment failures, high prices, or complex processes.
- Recovery Rate: Percentage of abandoned bookings later completed.
- Potential Revenue Loss: Estimated earnings from abandoned carts.

**Purpose:** Streamline the booking process and address friction points.

**Visualization:** Deploy appropriate graphs (bar/pie chart) to visualize the reports.

## 7. Platform Growth Report

- **Description:** Monitors user acquisition and partnership expansion.

- **Key Metrics:**

- New User Registrations: Growth in travelers, operators, and providers.
- Active Users: Monthly active travelers and operators.
- Partnership Growth: Number of new hotels/operators joining monthly.
- Regional Expansion: New destinations added to the platform.

**Purpose:** Track scalability and identify growth bottlenecks.

**Visualization:** Deploy appropriate graphs (bar/pie chart) to visualize the reports.

## 8. Payment Transaction and Fraud Report

- **Description:** Monitors payment success rates and fraudulent activities.

- **Key Metrics:**

- Payment Success/Failure Rate: Percentage of completed transactions.
- Chargeback Rate: Disputed transactions by travelers.

**Purpose:** Enhance payment security and reduce revenue leakage.

**Visualization:** Deploy appropriate graphs (bar/pie chart) to visualize the reports.

## Features Description for the TravelEase

### Data Population:

Populate the database tables with at least 50 to 100 records each using csv/excel files.

### Search Feature:

A **Search Feature** in the TravelEase system is designed to enhance usability, customization, and efficiency for travelers, tour operators, and administrators. This feature should be comprehensive, user-friendly, and optimized for quick responses. Below are the primary elements that should be incorporated into the search functionality

#### 1. Basic Search

*Keyword Search:*

- **Functionality:** Search trips by destination or tour operator name.
- **Autocomplete:** Suggestions for destinations, or operators as users type.
- **UI Example:** A search bar at the top of the homepage with dynamic dropdown suggestions.

#### 2. Advanced Filters:

*Trip Attributes:*

- **Filters:**
  - **Budget:** Slider for min/max price ranges.
  - **Duration:** 1-day excursions, week-long tours, etc.
  - **Group Size:** Solo, small group (2–5), or large group (10+).
  - **Sustainability Score:** Filter eco-friendly trips (e.g., 4+ stars).
  - **Accessibility:** Wheelchair-friendly, sign language guides, dietary accommodations.
- **UI Example:** Collapsible sidebar filters with checkboxes, sliders, and toggle switches.

*Date and Availability:*

- **Calendar Integration:** Select departure/return dates.
- **Real-Time Availability:** Highlight trips with immediate booking slots.

#### 3. Search Result Display:

- **Paginated Results:** Display search results in a paginated format to manage large data sets efficiently.
- **Highlighted Keywords:** Highlight keywords in the search results to improve user experience and show relevance.
- **Detailed Trip Cards:** Display key trip details in search results, including trip destination image, title, total cost per person, ratings, availability status and quick action buttons like “Book Now”, “Save to Wishlist”.

#### 4. Error Handling

- Provide user-friendly messages when a search yields no results or in case of any other error.

### **INSTRUCTIONS**

Familiarize yourself with the core functionalities of the **TravelEase** system, including user management, trip catalog management, trips processing, payment handling, review and rating systems and operator/service provider interactions.

#### **Define Core Functionalities:**

- User registration, authentication, and profile management.
- Trips listing and categorization.
- Booking management with detailed booking history.
- Payment processing and record-keeping.
- Review and feedback system for the trips and the guides and hotels.
- Tour Operator management for ongoing trips and cataloging them.
- Trip booking and tracking.
- Handling trips returns and refunds.
- Ensure your database has a sufficient amount of mock data for all entities, enough to adequately test and showcase the complexity of reports at least 50 to 100 records per table.
- Include data variation for different user demographics, trips categories, seasonal trends, and diverse payment methods.

#### **NOTE:**

- Ensure your project aligns with the rubric criteria for optimal evaluation.
- Pay special attention to the documentation and data population as they are crucial for demonstrating the system's capabilities.
- Aim for efficient report generation and robust database design to score higher in performance and database design sections.

#### **What to submit**

Submit your code and SQL queries for this project, a Desktop/Web based application programmed in C# using Visual Studio 2019 and SQL Server. A document highlighting the design in terms of relationships/associations between different entities like ERD, Schema Diagram, and Mappings of the relationships must be submitted.