**Sri Lanka Institute of Information Technology**

**BSc Honors in Information Technology Specializing in Cyber Security**

**IE2042- Database Management Systems for Security**

June 2022

**Group Assignment**

**Database Design, Implementation and Security**

**Anticipated Learning Outcomes**

LO1: Design and develop database solutions for real world applications.

LO2: Apply relational query languages and database programming languages in database applications.

LO3: Evaluate query plans and recommend solutions to speed up the database servers.

LO4: Apply appropriate solutions to address security and performance concerns related to databases

**Important Dates**

**Assignment Declaration - 5th September 2022**

**Group Details Submission – 12th September 2022**

**Assignment Deadline - 4th November 2022**

**Contribution to Final Grade**

**CA Weightage - 30%**

**You are required to,**

* Form a group of 4 members
* Register the group using the ‘Group Registration’ Microsoft form given in Courseweb before 12th September 2022

**Part 1 – 65 Marks**

* Analyze the given scenario and carry out the below tasks
* Document any assumptions made. (5 Marks)
* Develop the ERD and logical model. (15 Marks)

Normalize the logical model to 3NF. (5 Marks)

* Implement the logical model in MS SQL server and enter suitable sample data. (5 Marks)
* Identify all necessary constraints and enforce them on the tables. (10 Marks)
* Develop the required views, functions, stored procedures, triggers, and indexes as specified below. (25 Marks)
  + Identify 2 suitable triggers that can be applied on the database and explain and implement them. (5 Marks)
  + Identify the possible users of this database and create 2 views for them. (5 Marks)
  + Based on the below questions identify 2 indexes that will optimize the given queries and implement them. (5 Marks)
  + Write stored procedures to carry out the below DML functions. (10 Marks)

1. List all flight legs that depart or arrive at “Sydney” airport.
2. List all airplanes that can land at “Singapore” airport
3. Increase the fare of all tickets on flight “KL203” by 20%
4. List all the flights taken by passenger “Mary Ann”

**Database Scenario**

Consider an Online Airline Reservation System in which the airplanes and flight legs are maintained. The data requirements for this system are summarized as follows:

* There are many types of airplanes. An airplane is uniquely identified by airplane id and it is described by airplane name and total number of seats it contains.
* Airplane type is uniquely identified by type\_name and each type is described by maximum number of seats of the plane and the owned company. An airplane type must have one or more airplanes.
* Any type of airplane can be landed to many airport and an airport can have many airplane types. Airport is uniquely identified by airport code and is described by airport name, city, state.
* There should be one or more leg instances for one airplane. There should be many seats for one Leg Instance and those seats can be reserved through a reservation. Leg instance is described by number of available seats and uniquely identified by the date.
* A seat is uniquely identified by the seat number. When make the reservation; customer name and customer phone number should be recorded.
* Leg Instance is updated once it arrives and departs to the airport with Arrival time and the Departure time.
* A leg instance is a particular occurrence of a Flight Leg. Flight leg is uniquely identified by Leg\_number. Airport should have one or more flight Legs and it records the Scheduled departure time and the Arrival time when it departs and arrives to the airport.
* A flight must have one or more flight legs. A flight is uniquely identified by its flight number and it has further details such as Airline name and the schedule dates. And also flight must have one or more flight fare and flight fare can be uniquely identified by the fare code, and further described with the amount and restrictions.

**Part 2 – 35 Marks**

* Select and study two database vulnerabilities focusing on techniques and impact. (20 Marks)
* Understand how to mitigate the selected vulnerabilities and suggest countermeasures to overcome from the selected vulnerabilities. (15 Marks)

**Submission Procedure:**

* Group leader should submit the **soft copy of the report (Max 2000 words)** through the assignment submission link available in the Courseweb on or before **4th November 2022.**
* The report should include the diagrams for the ERD. Logical Design and normalized tables showing functional dependencies
* For the practical SQL you need to include Screenshots of the SQL codes you have written
* You are also expected to submit the SQL codes as a separate script

**Note:** Rename your submission with the group ID.