**Learning Outcomes:**

* Apply redundancy control in designing a database.
* Demonstrate a database solution using an appropriate tool based on a case study.

**Case Study:**

***Malaysia Airlines Reservation System***

There are four different airlines company in Malaysia: *Echo Airline* (EA1709), *Spark Airways* (SA1865), *Peak Airways* (PA2098), *Core Airways* (CA8760). Their flights involve the following six (6) states: Perak, Negeri Sembilan, Pahang, Sabah, Sarawak, Wilayah Persekutuan Kuala Lumpur. In each of the six (6) states, there is a (single) booking office. You are requested by the airlines company to design a central air-reservation database to be used by all booking offices.

Flight has flight number, number of total seats in business class, number of total seats in economy class for each airline. For each flight travel, the flight must be piloted by two pilots (captain and co-captain) and maximum of 3 flight attendants. A pilot may fly one or more flights. Pilot has staff number, staff first name, staff last name, age, year of experience, position, flying hours, and salary. To be a senior pilot, he/she need to have 20,000 flying hours. Flight attendant has unique id, full name, position, salary, phone number, and address. Address has street, city, province or state, postal code, and country.

The customers may come from any state, not just the six (6) above, and from any city in Malaysia. Customer has first and last name, mailing address, zero or more house phone numbers, and zero or more email addresses. Mailing address has street, city, province or state, postal code, and country. A customer may book one or more flights. The email address is unique for each customer. But the first and last names do not have to be unique.

A flight booking has a unique booking number, booking state (which state the booking was made from), booking date, flight number, date of departure, time of departure (in local time, and time is always in hours and minutes), date of arrival, time of arrival (in local time), class indicator (Business or Economy), total price, status indicator (three types: Booked. Canceled – the customer canceled the booking, Scratched – the customer had not paid in full 30 days prior to the departure), amount-paid-so far (in local currency), outstanding balance (in local currency), the first and last names to be printed on the ticket.

**Coursework Details:**

1. In this assignment, you are required to design, implement, and document a database system for *Malaysia Airlines Reservation System*.
2. Create the following queries using Data Manipulation Language (DML) – Each student must be able to explain the queries and justify the approach taken.

**Student 1**

1. Display all customers whose first name ends with consonant ‘*d*’ and lives in *Sarawak.*
2. Display the average of salary for pilots who have reached or exceeded *20,000* flying hours.
3. List the first name, last name, age, and experience of pilots who have piloted the flight for *Spark Airways.*

**Student 2**

1. Display customer’s first name and last name who have made bookings.
2. List flight attendant’s full name and position who have worked in the same flight as a pilot named ‘*Mikael Tinnason*’.
3. List all customers who did not live in any of the airline offices located. Please display the customer first name, last name, and customer’s state.

**Student 3**

1. Display customer’s first name, flight booking number, booking date, flight airlines name, date of departure, time of departure, and status indicator is *Canceled.*
2. List all customer’s first name and last name who did not place any booking. Sort the records by customer id in descending order.
3. List all customer’s first name and last name who still have outstanding balance for their flight bookings. Sort the records based on the outstanding balance in ascending order.

**Student 4**

1. Find the highest salary of flight attendants.
2. List the name and the position of flight attendants whose salary is neither *2,800* nor *3,500*.
3. List the booking’s date, flight number, and the client’s last name where the client does not have any outstanding balance.
4. Deliverables :

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| **Part** | **Component** |
| **1** | 1. Database and Database Management System  * Relate your discussion below to the case study * Disadvantages of file-based system * Advantages of Database and DBMS |
| **1** | 1. Business Rules & Normalization  * Generate a list of a complete business rules * Provide an example of UNF and perform normalization up to 3NF clearly showing all the steps with explanation |
| **1** | 1. Entity Relationship Diagram  * Design the database using Chen’s or Crow’s foot notation * Draw the ERD with any suitable tools such as Visio * All entities, attributes, relationship and constraints should be clearly shown |
| **1** | 1. Workload Matrix of each team member for Part 1 of the assignment (a copy of this will also need to be submitted via MS Teams) |
| **2** | 1. Database Schema  * Finalized ERD * Map the ERD to its corresponding relational schema and normalise all relations up 3NF * Identify the attributes, data types and constraints of each tables and document in data dictionary. * Generate the database diagram from the DBMS |
| **2** | 1. SQL-Data Definition Language (DDL)  * Create all tables with suitable data types * Screen shot all query statements * Screen shot all tables with its data |
| **2** | 1. SQL-Data Manipulation Language (DML)  * Insert a minimum of 10 rows of data into each table (where applicable) * Write SQL statements to answer question (2) above * Screen shot all query statements together with its executed result |
| **2** | 1. Workload Matrix of each team member for Part 2 of the assignment (a copy of this will also need to be submitted via MS Teams) |

**General Requirements:**

In this assignment you are required to:

* Work in a group of 4 members.
* Design and implement a solution to a business problem.
* Implement the solution using any Enterprise DBMS.
* Document the solution as set out in the assignment requirements.
* Submit the document online according to the date and time given below.
* Submit a Workload Matrix given by lecturer through MS TEAMS.
* Each group member is required to participate in all tasks / discussions together.
* Presentation schedules will be published at a later date through MS TEAMS.

## *Note: It is acceptable for discrete activities of this assignment to be undertaken by individual group members. However, it is essential that all group members understand the presentation in its entirety. At the end of the demonstration your group will be asked a series of questions to explore your understanding and analysis of the given problem. Responses to these questions such as “I don’t know because I didn't work on that part of the assignment” are not acceptable and will result in a penalty for either the entire group or specific individual(s).*

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| **Part** | **Assessment Criteria:** | **Marks Allocation** | **Online**  **Submission Date** |
| **1** | **Group Component (40%)**   1. Database and Database Management System 2. Business Rules & Normalization 3. Entity Relationship Diagram | 8%  12%  20% | **Week 8** |
| **2** | **Group Component (18%)**   1. Database Schema   **Individual Component (42%)**   1. SQL-Data Definition Language (DDL) 2. SQL-Data Manipulation Language (DML) | 18%  12%  30% | **Week 13** |