

**Project Topic:** Design of a database system for a frequent flyer program

**Deliver the final ER diagram, drafts of the ER diagram, and any supporting documentation.**

### **Project Component 1 Description**

450Airlines is a small commercial airline startup that needs to develop a Frequent Flyer program that allows passengers to collect mileage points and later redeem them for a set of prizes, discounts, and even cash rewards. The Frequent Flyer program should be supported by an Oracle database backend to store and manage all the data needed. The Frequent Flyer program also known as *FlyMore* identifies passengers as valued members through a FlyMore card that accumulates mileage points whenever they travel on a 450Airlines flight. For each physical mile travelled, the passenger gets Y points where Y is a configurable field stored in the database.

450Airlines is lucky enough to contact you and ask you to develop the database system that supports their FlyMore program. A crude description of the business rules and operations is provided below. Note that this information might not be comprehensive or complete and sometimes you need, as a designer, to get back to 450Airlines (the GTAs and Professor will play the role of 450Airlines) to get more details to help you deliver a complete database design.

The process starts with the passenger registering in the FlyMore program. The passenger should fill some personal data such as: the Social Security Number, full name, mailing address, and other demographic information such as age (date of birth), sex, marital status, occupation, etc. The card is mailed to the passenger in 3 business days after registering. If the passenger loses their card or if it is damaged due to misuse, they must request a new one. Another card is issued with a different ID, but it remains linked to the same passenger. The system should store the information of all the previous FlyMore cards as well as the card currently used by the passenger.

Whenever the customer boards on a 450Airlines flight in the airport, their FlyMore card is swiped on a smartcard reader and updated with the new mileage points for that flight ( $Y \times (\text{physical distance of the trip in miles})$ ). Note that a flight may consist of several stops (connections or trips) and accordingly the different mileage points for those trips should be stored and updated in the passenger account. For instance, if the passenger flies from Washington, DC to New Delhi through Chicago, Frankfurt, and Dubai. The passenger mileage account after completing the whole flight should be increased by (1) the number of physical miles from Washington, DC to Chicago, (2) the number of physical miles from Chicago to Frankfurt, (3) the number of physical miles from Frankfurt to Dubai, and (4) the number of physical miles from Dubai to New Delhi all multiplied by Y.

450Airlines introduces special promotion periods (such as during the low travel season) to encourage more passenger travel. Promotions could be double or triple mileage points added during these periods. The details of the promotions (dates, double, triple, etc mileage points) should be stored in specific entities in the database. In other words, the double and triple mileage points are just examples and could be something else. Passengers can redeem mileage points for awards. Awards could be redeemed for specific mileage points. This could be anything such as a free flight to Spain for 20,000 mileage points, a 30% discount on any flight to a US state for 10,000 mileage

points, a cashback of \$1 per 1000 mileage points, etc. The redemption process is done within other establishments known as “Exchange Centers”.

Another promotion provided by 450Airlines is the employer incentive program. This program provides the passenger who is an employee at 450Airlines an additional X% increase in the mileage points collected during any trip traveled. Moreover, 450Airlines, provides an additional Z% increase in the mileage points to all passengers referenced by a certain employee in the company.

To simplify the program, 450Airlines decided that the mileage points collected by passengers will have an indefinite duration and will not expire.

Develop the conceptual ER model of the database to support the above business rules and operations. You should be able to identify the necessary entity sets, their attributes, and the corresponding relationships among them. Obviously, entities such as Passengers, Cards, Flights, Trips, Employees, Login, Redemption\_History, Awards, Promotions, Exchange centers etc. should be part of the database. 10 to 15 entity sets would be a logical number for such a system. You should provide drafts of your ER diagram from the moment you scratch the first ER design to the point where you reach the final design to be submitted. I would expect to see at least 3 drafts to reach a final design. Drafts could be scratched by pencil on a paper and scanned, however, the final ER design should be drawn using a computer tool. If you believe that some information is missing or that some business rules can be enhanced, suggest additional assumptions and briefly explain their rationale in a supporting Word document to be provided with the final ER diagram and ER drafts in the submitted ZIP file.

Summary of the contents to be included in the submission ZIP file:

- 1- At least 3 drafts of the ER diagram (can be scratched on a paper and scanned) showing how you progressed towards the final ER design.
- 2- The final ER design drawn using a computer tool of your choice. The ER design file should be a PDF file and not an image.
- 3- A supporting Word document justifying any assumptions you made or added on the described business rules. Any comments documenting your experience from the first design draft to the final ER diagram should be included in the supporting Word document.
- 4- a Readme.txt file containing the names and GMU IDs of the team members.