NYU – TANDON SCHOOL OF ENGINEERING
CS-GY 6083 - B, FALL 2021
Principles of Database Systems

Project Part 1 [100 points with 15% weight]

In this first part of the project, you will focus on designing a suitable relational schema that can be used to store the data in the system. In the second part of the project, you will then build a web-accessible frontend that will allow users to use the service via their browsers. Both parts of the project may be done individually or in a group of two students (NO more than two students per group). You will receive an email from the TAs asking you to sign up as a group. Note that the second part of the project builds on top of this first part so you cannot skip this project part 1.

Project Guidelines: In this first part of the project, you will design the relational database (using Oracle Data Modeler) that stores all the data about the business case detailed below. You should use your own database system (preferably MySQL) on your laptop or an internet-accessible server. Following is the business case and a list of steps for this part of the project. Note that in this first part, you will only deal with the database side of this project - a suitable web interface will be designed in the second part.

Business Case:

Safe Fly Management Excellence (SAME) is a startup company expanding its business to provide insurance to travelers for domestic and international flights. To control the operation cost SAME was managing their minimal operational data about customers, purchased insurance plans, and account details of payment receipts. With growth in customer base and to exploit the opportunities of data analytics to aid in business intelligence, SAME has undertaken a database project to develop a sophisticated database and a database management system. SAME intends to add more details such as Airports, Airlines, Aircraft Models, Flights, Booking agents etc. in addition to data about customers, purchased insurance

plans, and account details of payment. SAME has extended an internship opportunity to your team to develop and implement this database project.

The project team has articulated a product scope to create a relational database that will incorporate schema design with all related entities and relationships among them to meet the business needs of SAME.

The business analyst has provided following details/requirements for the database design.

ENTITIES AND PRELIMINARY ATTRIBUTES

CUSTOMER: Name, Address, Email, Contact number with Country Code, Gender, Nationality, Number of passengers travelling (Including Customer him(her)self, Name and Contact Number (With Country Code) of Emergency Contact Person. Emergency contact cannot be one of the passengers.

INSURANCE PLANS: Plan Name, Description, Cost per passenger [Please refer to Appendix A for example of insurance plans

AIRCRAFT MODEL: Model Name, Manufacturer, Number of Engines, Number of Fleets [Please refer to Appendix B for the examples of Aircraft Models]

AIRLINES: Name of the Airline, Main Hub, Headquarter City, Country [Please refer to Appendix C for the examples of airlines]

AIRPORT: Airport code (e.g. JFK, EWR, BOM, PVG, PKG, DEL, BLR, MAA etc.) Name, City, Country, and Type of Airport (International/Domestic / Both) [Please refer to Appendix D for the examples of airports]

PASSENGER: Name and Date of Birth, Nationality, Gender, Passport Number, Passport Expiry Date

FLIGHT: Flight ID, Departure Airport, Arrival Airport, Departure Time, Departure Time Zone, Arrival Time, Arrival Time Zone

INVOICE: Invoice Number, Invoice Date, Invoice Amount in USD

PAYMENT: Payment Date, Payment Amount, Payment Method, Card Number, Name on Card, Expiry Date

BUSINESS RULES

a) Customer refer to as an individual who has purchased travel insurance for all passengers in travel
b) Customer may travel solo or with number of other passengers including family/friends
c) All parties (person) details need to be collected in Passenger entity, including Customer who has purchased the insurance
d) SAME accepts payments in only Debit or Credit Card payment methods and all payments must be paid in full against the invoice, at least three days prior to flight departure date. However, a customer can split a payment between two credit cards, debit cards, or a combination of both
e) Passengers may have multiple stops with different flight numbers or different airlines. SAME intends to record details of flight for each such stop. If a passenger has multiple stops but with the same flight number and airline, SAME does not want to record details for such multiple stops
f) For each passenger SAME intends to record Cabin Class, Meal Plan, and Special Requests [Please refer to appendix E for examples of Cabin Class, Meal Plan, and Special Requests]. A passenger may have multiple special requests
g) Customers can be of three types 1) Direct- who have directly booked flights with airline, 2) Member- those who have club membership with airline, 3) Booking Agent – Customers who have booked flights through booking agent. [Please refer to appendix F for examples of Membership Clubs, and Booking agents]. For a Member type of customer, SAME intends to record some additional details such as Membership Name, Associated airline, Membership Start Date, Membership End Date (if any). If a customer has booked flights through an agent SAME intends to record additional details such as Name, Web Address of Booking Agent and Phone Number
h) Airline may use multiple Aircraft Models in their fleet
i) Each airline has more than one flight in schedule

Appendix A:

Travel Insurance Plans
Trip Cancellation
Trip Interruption
Medical Insurance
Baggage Insurance
Accidental Death Insurance
All-inclusive Insurance

Appendix B

Aircraft Model
Airbus A330-300
Airbus A340-300
Airbus A340-500
Airbus A350-900
Boeing 777-200
Airbus A340-600
Boeing 777-300
Boeing 747-400
Boeing 747-8
Airbus A380-800

For details on Aircraft model, manufacturer, and number in fleet please refer to:

http://www.fi-aeroweb.com/US-Commercial-Aircraft-Fleet.html

Appendix C

<u>List of Airlines</u>

American Airlines
JetBlue Airways
US Airways
Delta Air Lines
United Airlines
Emirates
Qatar Airways
Air China
Cathay Pacific
China Airlines
China Southern Airlines
British Airways
Lufthansa
Swiss
Korean Air
Air Canada
Air India
Jet Airways
Singapore Airlines

For more information regarding airline main hub, headquarter etc. please refer:
https://www.nationsonline.org/oneworld/major_airlines.htm

Appendix D

<u>List of Airports</u>

https://www.world-airport-codes.com/alphabetical/airport-code/j.html?page=1

Appendix E

<u>Meal Plan</u>

Indian Vegetarian Meal (AVML)
Non-vegetarian Hindu Meal (HNML)
Vegetarian Jain Meal (VJML)
Kosher Meal (KSML)
Bland Meal (BLML)
Diabetic Meal (DBML)
Gluten-Friendly Meal (GFML)
Low-Fat Meal (LFML)
Low-Salt Meal (LSML)
Vegan Meal (VGML)
Child Meal (CHML)
Baby Meal (BBML)

<u>Special Assistance</u>

Disability and Mobility Assistance
Travelling with infants
Travelling with animals
Elderly passenger
Medical assistance

Economy Class
Economy Plus Class
Business Class
First Class

Appendix F

Booking agent
Kayak
Expedia
Priceline
Orbitz
Hotwire
CheapOair
Travelocity

Membership
TrueBlue
Rapid Rewards
Mileage Plan
SkyMiles
AAdvantage
MileagePlus
HawaiianMiles
British Airways Executive Club
AirFrance & KLM Flying Blue
Virgin Atlantic Flying Club
Emirates Skywards Blue/Silver/Gold/Platinum

For this project, identify appropriate entities, identify relationships among entities, attributes of each entity and their data type & size constraints, design and implement a centralized relational database system that collects relevant data for SAME. All entities designed and implemented should have your initials as a prefix (e.g. AP) if you are performing the project individually, else should have a combination of initials of both team members (e.g. SMSK) as a prefix.

For any additional entities, attributes or business rules that are not defined in the business case, please state all assumptions you have made (if any) while designing and implementing the database.

Project Part I Submission:

Submit following deliverables towards project part 1 assignment.

a) Create a logical E-R model for database schema with appropriate relationships amongst them. Submit screenshot.
b) Create a relational model, depicting all entities, attributes (name, type, size, mandatory/optional, primary key), & relationships (foreign keys). Submit screenshot.
c) Use the relational model to create the DDL script. Submit DDL code.
d) Write commands and apply necessary CHECK constraints to apply defined business rules to enforce data consistency. Submit DDL code.
e) Populate meaningful sample data for all entities (20 to 30 records per entity). Submit DML code.
f) List total number of records populated for each entity (just record counts, not full data set). Submit COUNT (*) query and result for each table.
g) Write data dictionary queries that detail all tables, columns (data-type, size, mandatory/optional), constraints and attribute comments of schema objects. Submit data dictionary queries and their corresponding results.
h) Write a summary that describes justification of your entire design, including any assumptions made about the business rules that are not stated in this project business case. Submit summary (no more than 1 page)

This should be a paper in a single PDF document (Times New Roman font, 12pt, single spacing) with all screenshots inserted within. On the cover page clearly state the course, section, submission date, student names and IDs on the title page. If you are working in a group, the name and ID of both students must be listed. There should be a Table of Contents page after the cover page. Every student, irrespective of performing the project in a group or as an individual, needs to submit the document at Brightspace Assignment, Project Part I.