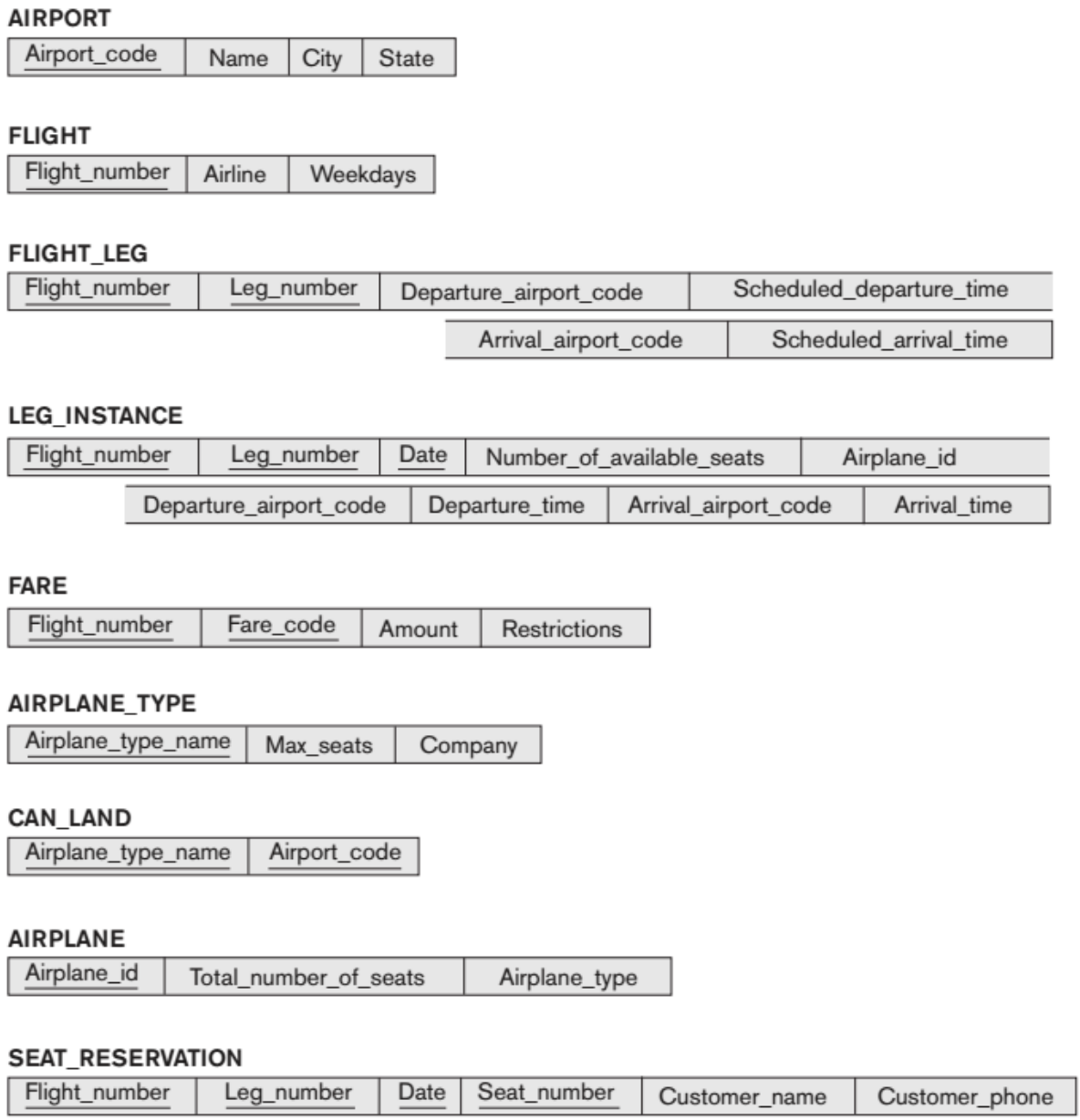
Database Management
2017-2018
Midterm Homework: Extending a Conceptual Design and Its Implementation
(Do the homework with your 2-to-4 members team.
Due date is 21 December 2017. Demo dates are 21-22 & 28-29 December 2017)

PART-I (**60 points**): In this homework, you will physically implement a database design given below.



According to model, the following requirements are satisfied:

The AIRLINE relational database schema shown in the above figure describes a database for airline flight information. Each FLIGHT is identified by a Flight_number, and consists of one or more FLIGHT_LEGs with Leg_numbers 1, 2, 3, and so on. Each FLIGHT_LEG has scheduled arrival and departure times, airports, and one or more LEG_INSTANCEs—one for each Date on which the flight

travels. FAREs are kept for each FLIGHT. For each FLIGHT_LEG instance, SEAT_RESERVATIONs are kept, as are the AIRPLANE used on the leg and the actual arrival and departure times and airports. An AIRPLANE is identified by an Airplane_id and is of a particular AIRPLANE_TYPE. CAN_LAND relates AIRPLANE_TYPEs to the AIRPORTs at which they can land. An AIRPORT is identified by an Airport_code.

1. Write down the appropriate SQL scripts (DDL statements) for creating the database and its relational model. You can select any of the DBMS you wish.

2. Populate the database you just created again using SQL script file loaded with sample tuples. (The tables should have enough number of tuples for the SELECT statements, asked in the 5th step, to be run accordingly.)

3. Write down 3 triggers for 3 different tables. Triggers should be meaningful.

4. Write down 3 check constraints and 3 assertions. Check constraints and assertions should be meaningful.

5. Write down the following SQL statements:
    a. Write sample INSERT, DELETE and UPDATE statements for 3 of the tables you have chosen.
    b. Write 10 SELECT statements for the database you have implemented.
        i. 3 of them should use minimum 2 tables.
        ii. 4 of them should use minimum 3 tables.
        iii. 3 of them should use minimum 4 tables.
    c. Write 4 SELECT statements to exemplify nested and/or correlated nested queries.
    d. Write 2 SELECT statements to exemplify EXISTS and NOT EXISTS statements.
    e. Write 3 SELECT statements to exemplify LEFT, RIGHT and FULL OUTER JOIN statements.
6. Create 3 views that are reasonable.

PART-II (**20 points**): Draw an EER diagram for AIRLINE relational database and extend your design to satisfy the following requirements:

- Separate the CUSTOMER entity from the SEAT_RESERVATION and extend it with the following attributes; e-mail, adress, country, passpoart number.
- Create a COMPANY entity for both AIRPLANE and AIRLINE. Use generalization/specialization hierarchy.
- Create an entity for frequent flyer customer tracking called FFC to keep track of the customers' flight information. If a customer has checked-in physically a flight create a transaction record with the mileage information assigned to that flight leg.

Identify all the important concepts represented in EER diagram. In particular, identify the abstractions of classification (entity types and relationship types), aggregation, identification, and specialization/generalization. Specify (min, max) cardinality constraints whenever possible. List details that will affect the eventual design but that have no bearing on the conceptual design. List

the semantic constraints separately. Please do not hesitate to state your own assumptions regarding the conceptual design.

PART-III (**20 points**) Repeat PART-I by forward engineering the conceptual design you just created in previous part. Notice that

PART IV (**BONUS! +20 points**) Propose a customer segmentation model using FFC entity to promote customers with the appropriate rewards defined for each segment. Research about the term “customer segmentation” and extend your design if possible. If not, explain your solution.

Good luck.