

DATABASE SYSTEM DESIGN 1ST midterm

AIRPORT

AIRPORT_CODE	NAME	CITY	STATE
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FLIGHT

FLIGHT_NUMBER	AIRLINE	WEEKDAYS
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FLIGHT_LEG (分段行程)

FLIGHT_NUMBER	LEG_NUMBER	DEPARTURE_AIRPORT_CODE
SCHEDULE	DEPARTURE_TIME	ARRIVAL_AIRPORT_CODE
SCHEDULE	ARRIVAL_TIME	

LEG_INSTANCE

FLIGHT_NUMBER	LEG_NUMBER	DATE	AIRPLANE_ID
DEPARTURE_AIRPORT_CODE	DEPARTURE_TIME		
ARRIVAL_AIRPORT_CODE	ARRIVAL_TIME		

FARES

FLIGHT_NUMBER	FARE_CODE	AMOUNT	RESTRICTIONS
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AIRPLANE

AIRPLANE_ID	TOTAL_NUMBER_OF_SEATS
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SEAT_RESERVATION

FLIGHT_NUMBER	LEG_NUMBER	DATE	SEAT_NUMBER
CUSTOMER_NAME	CUSTOMER_PHONE		

Figure1

1. Consider the AIRLINE relational database schema shown in Figure1, which 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, etc. Each leg has scheduled arrival and departure times and airports. FARES are kept for each flight. For each leg instance, SEAT_RESERVATIONS are kept, as is the AIRPLANE used in the leg, and the actual arrival and departure times and airports.

Questions:

- (15%) Present a conceptual model (ER- diagram) for this Database.
- (15%) Use SQL command to create the relational schema (create table...), including all related integrity constraints.

Specify the corresponding SQL queries for the query c) ,d), and e):

- (15%) For each flight, list the flight number, the departure time for the first leg of the flight, and the arrival time for the last leg of the flight. (assuming that the legs are arranged sequentially according to leg number.)
- (20%) For each flight that has at least 2 legs, list “leg number” and “the number of available seats” (airplane seats – all reserved seats of that leg) from each leg of the flight.
- (15%) For each flight, calculate average Fares (flight fares / number of legs), and number of different planes used in the flight.

2. Suppose a financial organization A want to build a relational database. Another

consulting company B get the contract and is responsible for implementing this project. The entire work is divided into 4 steps of processes --- “Requirement analysis”, “Model design”, “Data preparation (cleaning, extraction, transformation, loading...)”, “Testing and confirmation”. There are 4 different groups of people to work together --- “Manager”(from A, who supervises this project, but do not have the background of computer science), “Expert”(from B), “Clerks”(from A, who will use the Database), and “Local IT” (the IT people in A, who maintain most of the systems, including this new database). Please answer the following questions:

a) (10%)For each of the processes, which groups of people are likely to get involved? Please explain.

b) (10%) Which process(es) is/are the most critical step(s) for “Manager”, “Clerk”, and “Local IT” to trustfully work around the database in the long run? Please Explain.