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Subject:

Advanced Databases – project classes

Topic:

Description of Oracle database implementation for flights reservation

1. The number of flights done every day has reached almost a hundred thousand. If we assume that every airplane can carry about two hundred passengers we can easily compute that we need to process twenty millions reservations for only one day. It is a huge challenge for the management systems. If the design of a system is not appropriate the efficiency can be insufficient. A major role is played by the implementation of a database.
   It must be able to handle all the requests in a short period of time. It is an interesting topic and that is the reason why we try to build our own solution.

2. Database structure
   Our concept consists of nine tables. A description of them is given below:
   - **a.** CLIENT – includes ten attributes. The primary key is a client ID, foreign key is a country ID. The other attributes concerns client's personal data such as first/last name, his address, telephone number and e-mail. Flat number, telephone and e-mail are not required.
   - **b.** COUNTRY – consists of two attributes. The primary key is an ID. We need also to define a name of a country which must be unique.
   - **c.** PASSENGER – contains ID as a primary key and Client/Carrier ID as foreign keys. Loyalty points and a number of taken flights are also assigned to a passenger.
   - **d.** RESERVATION – includes ID which is a primary key and three foreign keys: flight ID, Passenger ID and payment ID. The last attribute is the number of a seat in a plane, assigned to this reservation
   - **e.** PAYMENT – can be identified by an ID, which is a primary key. The other attributes are the amount of payment, date of transaction and the information whether the payment was made by credit card or not.
   - **f.** AIRPLANE – includes four attributes. The primary key is its ID. Plane is described also by its manufacturer, model and number of seats available for passengers.

g. FLIGHT – consist of eight attributes. The primary key is ID. Four foreign keys are Carrier ID, Airplane ID, Departure Airport ID and Arrival Airport ID. Flight need to have departure and arrival date.

h. AIRPORT – can be identified by ID. It's also its primary key. The foreign key is Country ID. An airport is additionally described by name and a city in which is placed.

i. CARRIER – includes three attributes. Primary key is carrier's ID. Carrier have also its name and is rated in the scale between 0-100 (more is better).

3. Relations between tables

a. One client creates one passenger. One client lives in one country but one country can be inhabited by many clients.

b. One passenger can make many reservations. Passenger chooses his favorite carrier but one carrier can be chosen by many passengers.

c. Many reservations can be made for one flight but there is only one payment for one reservation.

d. Flight is always provided by specific carrier but one carrier can offer many flights. To specific flight there can be only one assigned plane but one plane can be used in many flights. One flight can be taken only from one airport and need to be completed on other specific airport but one airport can have many connections from and to it.

e. Airport is located in one country but in specific country there can be many airports.

4. Transactions
    1. Passenger wants to make a reservation for the nearest flight from his city to Warsaw and provided by his favorite carrier. He searches for available flights on this route provided by the specific carrier and orders them by date. The nearest one with available seats is chosen. The payment by card is done and the reservation is created. The number of available seats in the airplane is reduced by one. The passenger's flight number and loyalty points are increased by one.

    2. Lufthansa wants to reward its best customers. All the passengers that has traveled by their airlines in 2016 at least 5 times from Poland to Germany by Boeing 787 get additional 10 loyalty points. The passengers also need to have a total number of taken flights greater than 10 and they have to live in Poland to receive the bonus. The passenger's favorite carrier changes to Lufthansa after granting that bonus.

    3. All Boeing's 737 airplanes, used by WizzAir have spoiled. Reservations and payments for flights by those planes in the current month are withdrawn. Those passengers that have reservation for this flights get 5 loyalty points as a compensation. Their flight's number is reduced by one. Broken Boeings 737 are replaced by Boeings 787 for all future connections for the next month.

    4. Client wants to take a flight from Warsaw Chopin Airport to Italy in specific day by the most comfortable airplane - Boeing 787 and by the top rated carrier. He wants to travel with his family so he need to make more than one reservation for the flight. The reservation for the first flight on the specified day provided by the top rated carrier by Boeing 787 from Warsaw Chopin Airport to Italy is made. Passengers favorite carrier is set to be the top rated carrier and his loyalty points and flights number are increased by the number of reserved flights. The number of available seats in the plane is reduced by the number of reservations.

    5. Part of airport in Barcelona will be under renovation in January. The place of a departure is changed from Barcelona to Madrid for all flights provided by WizzAir in January. Rating of WizzAir is decreased. The passengers with reservation on those flights get 5 loyalty points as a compensation. Also they get 10 euro discount on those flights - amount paid is reduced by 10 euro.