

KATHMANDU UNIVERSITY

DHULIKHEL, NEPAL

Department of Computer Science & Engineering (DoCSE)



Non-credit Assignment

COMP-232

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Submitted to:

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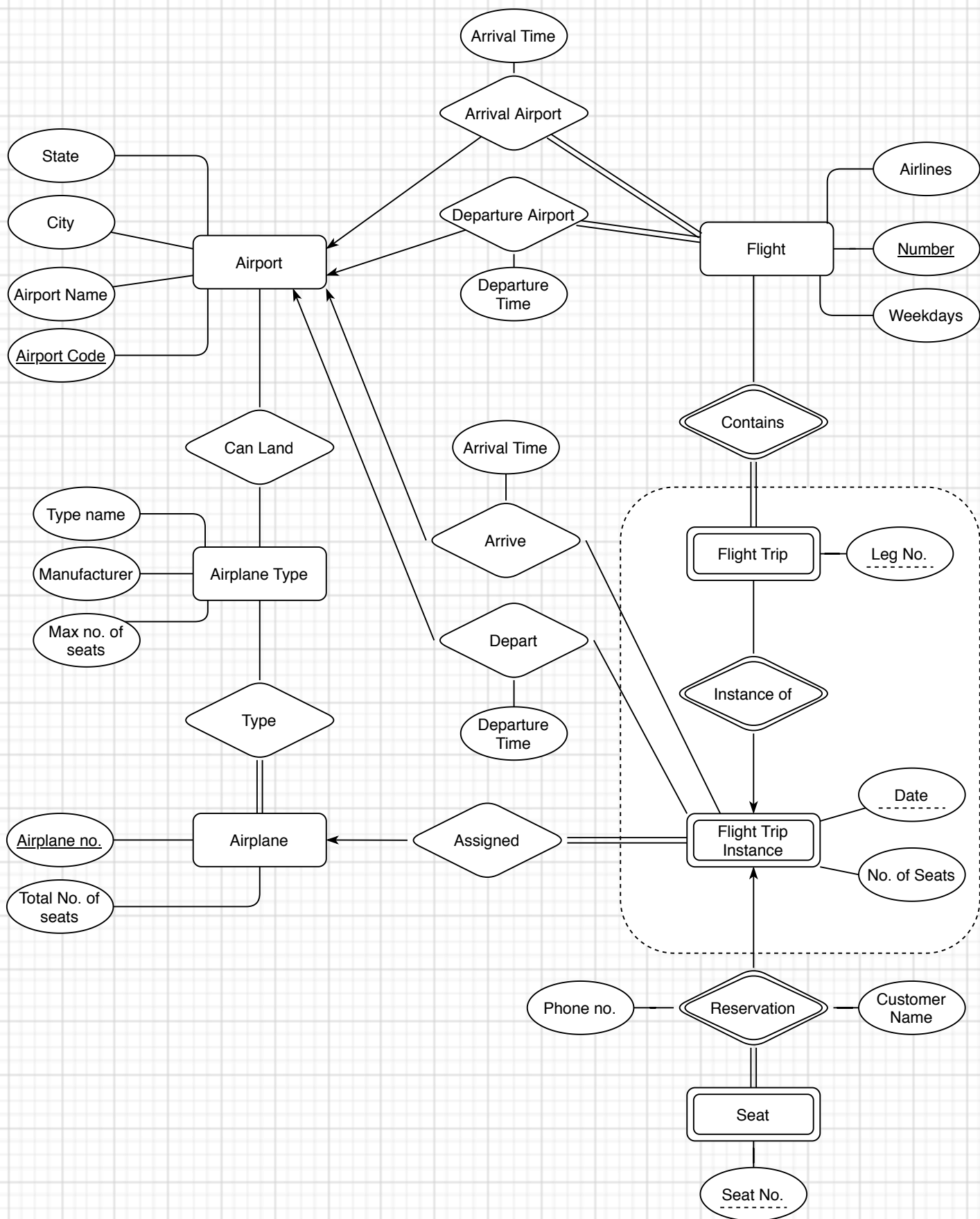
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Q. Design an ER diagram considering the following description from database:

- Airport, keeping its unique Airport Code, the Airport Name, and the City and State in which the Airport is located.
- Each airline flight has a unique number, the Airline for the flight, and the Weekdays on which the flight is scheduled.
- A flight is composed of one or more flight trip. Each flight trip has a leg number, Departure airport and Scheduled Departure Time, and an arrival airport and Scheduled Arrival Time.
- A trip instance is an instance of a flight trip on a specific date. The Number of available seats and the airplane used in the trip instance are also kept.
- The customer reservations on each trip instance include the customer name, phone, and seat numbers for each reservation.
- Information on Airplanes and Airplane Types are also kept. For each Airplane type the Type Name, manufacturing company, and maximum number of seats are kept.
- The Airports in which planes of this type can land are kept in the database.
- For each Airplane, the Airplane Id, Total number of seats and Type are kept.

ANSWER.

The ER diagram for the given description is included as follows:



To describe the Database design according to ER diagram, we can enlist the entities, relationships and so on.

1. Entities

The entities in the database design are:

- *Airport*
- *Airplane Type*
- *Airplane*
- *Flight*
- *Flight Trip*
- *Flight Trip Instance*
- *Seat*

The entities and their attributes are based on the description elucidated in the question.

Weak Entities

The *weak entities* among those entities are:

- *Flight Trip*
- *Flight Trip Instance*
- *Seat*

Flight Trip is a specialization of *Flight* and is used to represent collectively describe Flight. As such, flight trip is descriptively a flight hence is a weak entity.

Similarly, *Flight Trip Instance* is another specialization of *Flight Trip* and is used to individualize or instantize Flight trip. So, trip instance is descriptively linked to Flight Trip thus being another weak entity.

Seat is also another weak entity which is used for representing an individual instance of the seating inside the airplane. In our design, seat can not exist independently however is associated with the relationship '*Reservation*' for representing a particular seating vacancy that is allocated to a particular customer.

2. Relationships:

The Relationships are described below:

- *Can Land (Airplane Type, Airport)*
According to description, certain Airplane Type are capable of landing in particular airports. A real-life example can be the *Lukla Airport* which can only sustain a small passenger airplane.

- ***Type (Airplane, Airplane Type)***
This relationship is a classification of Airplane into Airplane Types. Different Airplanes are categorized by Type.
- ***Arrival Airport, Departure Airport (Flight, Airport)***
This relationship is used for Airport and Flight. A flight must have a source and a destination, and this relationship exactly depicts the *source as Departure Airport* and *destination as Arrival Airport*. Each relationship has an attribute associated with time to represent the timeline for arrival or departure.
This relationship represents a total participation of Flight since Flight indispensably have a source and destination.
- ***Contains (Flight, Flight Trip)***
Contains relationship describes that a Flight consists of Flight Trip. A flight trip is a specialization of Flight. It is an *Identifying relationship* as a flight trip will always be defined by a flight and vice versa. Without a flight trip, a flight cannot exist and vice versa.
- ***Instance of (Flight Trip, Flight Trip Instance)***
Like Contains, *Instance of* is another specialization of *Flight Trip*. There can be numerous flight trips from one place to another at different time. Because of particular attributes, flight trip instance is specialization of a flight trip. This relationship is another identifying relation as an Instance of flight trip cannot exist if there exists no such flight trip.
- ***Assigned (Flight trip instance, Airplane)***
This relationship defines the relation between trip instance and airplane as a flight trip must be associated with an airplane. The Airplane is a medium for carrying out an instance of a flight trip.
- ***Reservation (Flight trip instance, Seat)***
It defines a relationship between *trip instance* and *seat*. A trip instance contains numerous seats and its individualization is seat. A customer can reserve a seat from limited seats of a trip instance and this relationship defines exactly the same.
- ***Arrive, Depart (Flight trip instance, Airport)***
Arrive and Depart is used to represent the action of a flight trip instance associated to an airport. A trip instance must start from a source airport and end at another destination airport. These relationship defines such an action.

3. Aggregation

Entities *Flight Trip* and *Flight trip instance* can be aggregated together as they exist as specialization and generalization of one another. Combined together they can represent a particular element in a set of Flight.

This is a general description of the database design ER diagram.