Project Assignment No. 1:

E-R and Relational Models

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Entity-Relationship Model



Brief Rational of the ER Model

Our ER model is centered on the MakeReservation relationship that connects the three entities, Employee, Customer, and Reservation, together. The Employee entity has all of the shown attributes and also has a primary key, Social Security #, which distinguishes which employee is which. The Customer entity has all of the shown attributes and has two primary keys; LastName and Telephone. A Customer also owns an Account entity, which is divided by their account numbers. The Reservation entity has all of the shown attributes and is separated by its reservation numbers. It also has Legs, which are the specific preferences on the flight for each airport. Therefore, it is a relationship between the three entities, Reservation, Airport, and Flight. Each Flight has a stop at a specific Airport. Each flight is also operated by an Airline.

Relational Model

CREATE TABLE Airport (

Id CHAR(3),

Name CHAR(20) NOT NULL,

City CHAR(30) NOT NULL,

Country CHAR(30) NOT NULL,

PRIMARY KEY (Id) )

CREATE TABLE Airline (

Id CHAR(3),

Name CHAR(20) NOT NULL,

PRIMARY KEY (Id) )

CREATE TABLE Flight (

Number CHAR(4),

Airline CHAR(3),

Fare INTEGER NOT NULL,

DaysOfWeek CHAR(30) NOT NULL,

Stops CHAR(30) NOT NULL,

Seats INTEGER NOT NULL,

ReservationNum CHAR(30) NOT NULL,

PRIMARY KEY (Number, Airline),

FOREIGN KEY (Airline) REFERENCES Airline(Id) )

FOREIGN KEY (ReservationNum) REFERENCES Reservation(ReservationNum) )

CREATE TABLE OperatedBy (

Number CHAR(4) NOT NULL,

Airline CHAR(3) NOT NULL,

PRIMARY KEY (Number, Airline),

FOREIGN KEY (Airline) REFERENCES Airline(Id),

FOREIGN KEY (Number) REFERENCES Flight(Number) )

CREATE TABLE Reservation (

ReservationNum CHAR(10),

Date DATE NOT NULL,

Passengers CHAR(30) NOT NULL,

Legs CHAR(30) NOT NULL,

TotalFare INTEGER NOT NULL,

FareRestrictions INTEGER NOT NULL,

BookingFee INTEGER NOT NULL,

CustomerRep CHAR(30) NOT NULL,

CustomerRep Phone CHAR(30) NOT NULL,

PRIMARY KEY (ReservationNum),

FOREIGN KEY (CustomerRep, CustomerRepPhone)

REFERENCES Employee(LastName, Telephone) )

CREATE TABLE Employee (

SocialSecurityNum CHAR(9),

LastName CHAR(20) NOT NULL,

FirstName CHAR(20) NOT NULL,

Address CHAR(50) NOT NULL,

City CHAR(30) NOT NULL,

State CHAR(2) NOT NULL,

ZipCode CHAR(5) NOT NULL,

Telephone CHAR(10) NOT NULL,

StartDate DATE NOT NULL,

HourlyRate INTEGER NOT NULL,

PRIMARY KEY (SocialSecurityNum),

UNIQUE (LastName, Telephone) )

CREATE TABLE Customer (

LastName CHAR(20),

Telephone CHAR(10),

AccountNumber CHAR(9) NOT NULL,

FirstName CHAR(20) NOT NULL,

Address CHAR(50) NOT NULL,

City CHAR(30) NOT NULL,

State CHAR(2) NOT NULL,

ZipCode CHAR(5) NOT NULL,

EmailAddress CHAR(30) NOT NULL,

AccountCreation DATE NOT NULL,

CreditCardNum CHAR(30) NOT NULL,

Preferences CHAR(100) NOT NULL,

Rating CHAR(8) NOT NULL,

PRIMARY KEY (LastName, Telephone),

CREATE TABLE Owns (

AccountNumber CHAR(9) NOT NULL,

LastName CHAR(20) NOT NULL,

Telephone CHAR(10) NOT NULL,

PRIMARY KEY (AccountNumber, LastName, Telephone) )

CREATE TABLE Account (

Number CHAR(9),

DateCreated DATE NOT NULL,

Status CHAR(10) NOT NULL,

Reservations CHAR(50) NOT NULL,

PRIMARY KEY (Number),

FOREIGN KEY (Number, DateCreated)

REFERENCES Customer(AccountNumber, AccountCreation) )

CREATE TABLE MakesReservation (

AccountNumber CHAR(9) NOT NULL,

BookingRepSocial CHAR(9) NOT NULL,

ReservationNum CHAR(10) NOT NULL,

PRIMARY KEY (AccountNumber, CustomerRep, CustomerRepPhone, ReservationNum),

FOREIGN KEY (AccountNumber) REFERENCES Customer(AccountNumber),

FOREIGN KEY (BookingRepSocial)

REFERENCES Employee(SocialSecurityNum),

FOREIGN KEY (ReservationNum)

REFERENCES Reservation(ReservationNum))

CREATE TABLE StopAt (

FlightNumber CHAR(4) NOT NULL,

DepartureAirportId CHAR(3) NOT NULL,

DepartureDay CHAR(10) NOT NULL,

DepartureTime CHAR(5) NOT NULL,

ArrivalDay CHAR(10) NOT NULL,

ArrivalTime CHAR(5) NOT NULL,

PRIMARY KEY (FlightNumber, AirportId),

FOREIGN KEY (FlightNumber) REFERENCES Flight(Number),

FOREIGN KEY (AirportId) REFERENCES Airport(Id) )

CREATE TABLE Leg (

ReservationNum CHAR(10) NOT NULL,

StartAirportId CHAR(3) NOT NULL,

DestAirportId CHAR(3) NOT NULL,

FlightNumber CHAR(4) NOT NULL,

Departure DATE NOT NULL,

Class CHAR(20) NOT NULL,

SeatNumber CHAR(5) NOT NULL,

SpecialMeal CHAR(10),

PRIMARY KEY (ReservationNum, StartAirportId, DestAirportId, FlightNumber),

FOREIGN KEY (FlightNumber) REFERENCES Flight(Number),

FOREIGN KEY (StartAirportId) REFERENCES Airport(Id),

FOREIGN KEY (DestAirportId) REFERENCES Airport(Id),

FOREIGN KEY (ReservationNum) REFERENCES Reservation(ReservationNum) )

Brief Rational of Relational Model

Each table has the corresponding attributes shown in the ER model. The primary keys of each table are shown as underlined names in the ER model. Some attributes cannot be null, which we have shown in the relational model by putting NOT NULL next to the attribute. Most of the tables are self explanatory.