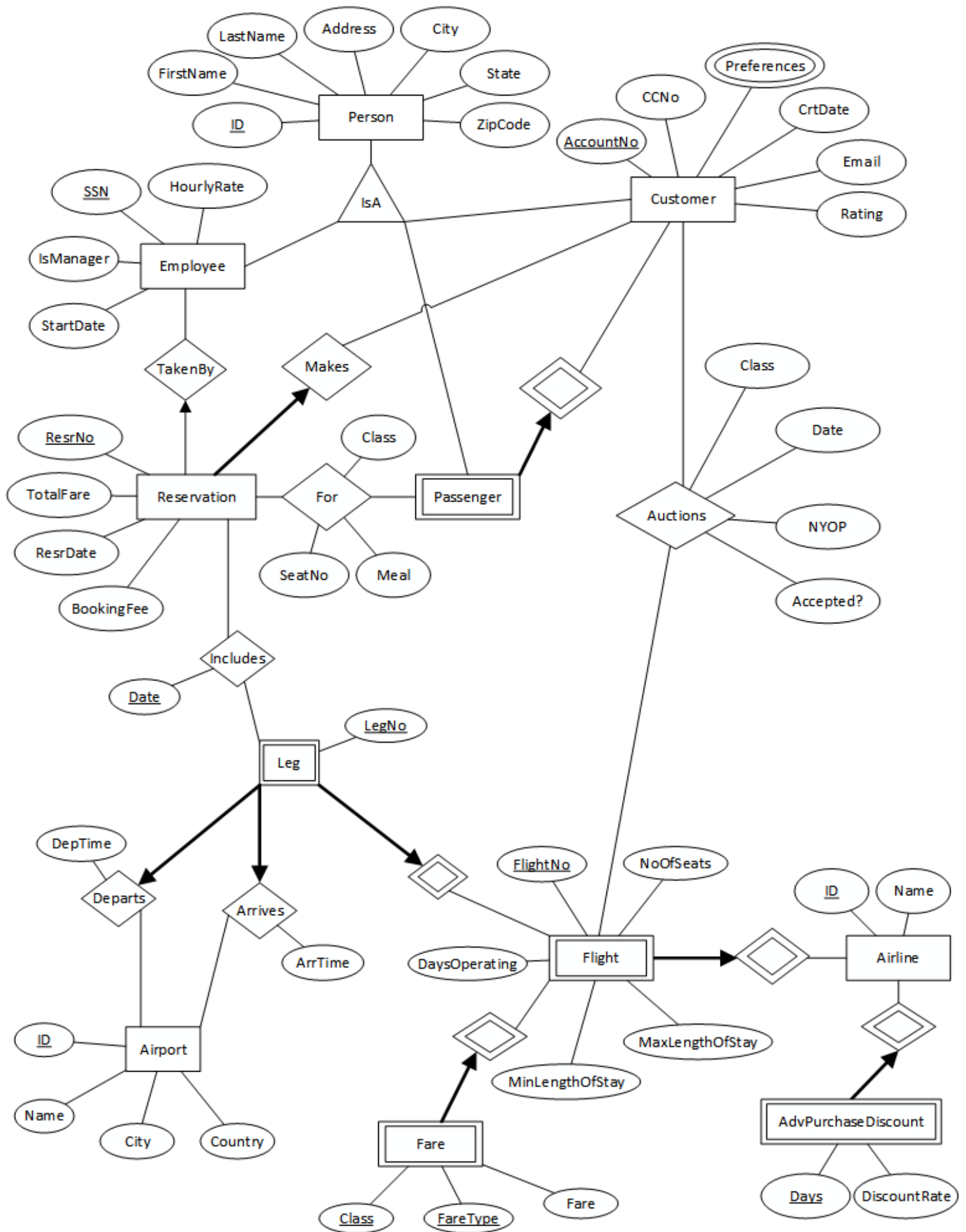


E-R Diagram



Notes:

1. Please see section 4.4.2 in the coursebook for line-based representation vs. cardinality constraints.
2. Double boxes (**Flight**, **Leg**, **AdvPurchaseDiscount**, **Fare**, **Passenger**) represent weak entities. Please refer to section 4.4.3 in the book for more information.
3. **NYOP** stands for *Name Your Own Price* that means the price a customer sets for an auction that he or she participates in.
4. For simplification, we assume that an auction is for one seat of one flight.
5. For simplification, we assume that a passenger will have the same seat number for every leg.
6. We need a separate **Passenger** entity because a customer can buy a ticket for another person who does not have an account. For example, a customer can buy a ticket for his 6 year old son.
7. A flight can have different fare types: one-way, roundtrip, minimum fare that airlines will accept in reverse auction (*hidden fare*, hidden from customers). Fares also depend on the cabin class.
8. The above diagram assumes that a seat can be of any class.
9. Auction: a customer can specify a price when bidding on an auction. If that price is lower than the hidden fares, the bid is rejected. If the price meets or exceeds the hidden fares then the bid is accepted. If a bid is accepted, a reservation will be recorded and the auction ends. If a bid is rejected, the customer can bid again with a higher price as long as the bid is before the departure date and the flights still have enough seats.
10. **'DaysOperating'** is a 7 bit string representing which days of the week the flight operates from the STARTING CITY (i.e., FIRST STOP). For example, if Continent flight #700 flies only on Sundays and Wednesdays, then the **DaysOperating** attribute value would be **1001000**.
11. Each flight has associated with it a sequence of stops. This information is stored in the entity **'Leg'**. For example, an entity with attributes "**Leg**(Flight#=700, AirlineID=AA, LegNo=2)" participates in relationship **"Departs"** with entity **"Airport(ID=DFW, ...)"** and relationship **"Arrives"** with entity **"Airport(ID=LGA, ...)"** signifies that American Airline Flight number 700's *second* leg departs from Dallas Fort Worth Airport and arrives at LaGuardia Airport.
12. The E-R Diagram assumes that each airline has an advance purchase discount program that applies to all of its flights. For example, an entity **"AdvPurchaseDiscount(AirlineID = AA, Days = 7, DiscountRate = 10)"** signifies that a discount rate of 10% will be applied to all 7-day advance purchase for American Airlines flights. When calculating discount, the entity instance with the max Days attribute should be used.
13. The E-R Diagram assumes that there are no circles in a flight's leg sequence, i.e., legs of a flight have a unique departure airport.
14. For simplification, the E-R Diagram assumes that a flight has fares for the whole flight, not for individual leg. For example, AA flight 700 stops at LGA, ORD, OKC, DFW. If a customer books only the OKC-DFW leg, he or she will have to pay for the whole flight from LGA to DFW.
15. The relationship between managers and employees can be added but it is not necessary for the operations in this project. So it is simplified to just an attribute **'IsManager'** in the **'Employee'** entity.
16. The E-R diagram can be extended in order to know if a flight is on-time or not.

17. The tables defined below are not defined in any particular order, so simply attempting to copy-paste the CREATE TABLE statements into the SQL command editor will likely throw exceptions. A better approach would be to define the tables in a well-defined order, or to add primary-key and other constraints separately using ALTER TABLE statements.

Relational Model

```
CREATE TABLE Airline (  
  Id          CHAR(2),  
  Name        VARCHAR(100) NOT NULL,  
  PRIMARY KEY (Id));
```

```
CREATE TABLE AdvPurchaseDiscount (  
  AirlineID    CHAR(2),  
  Days         INTEGER NOT NULL,  
  DiscountRate NUMERIC(10,2) NOT NULL,  
  PRIMARY KEY (AirlineID, Days),  
  FOREIGN KEY (AirlineID) REFERENCES Airline(Id),  
  CHECK (Days > 0),  
  CHECK (DiscountRate > 0 AND DiscountRate < 100));
```

```
CREATE TABLE Flight (  
  AirlineID    CHAR(2),  
  FlightNo     INTEGER NOT NULL,  
  NoOfSeats    INTEGER NOT NULL,  
  DaysOperating CHAR(7) NOT NULL,  
  MinLengthOfStay INTEGER NOT NULL,  
  MaxLengthOfStay INTEGER NOT NULL,  
  PRIMARY KEY (AirlineID, FlightNo),  
  FOREIGN KEY (AirlineID) REFERENCES Airline(Id),  
  CHECK (NoOfSeats > 0),  
  CHECK (MinLengthOfStay >= 0),  
  CHECK (MaxLengthOfStay > MinLengthOfStay)  
);
```

```
CREATE TABLE Airport (  
  Id          CHAR(3),  
  Name        VARCHAR(100) NOT NULL,
```

City VARCHAR(50) NOT NULL,
Country VARCHAR(50) NOT NULL,
PRIMARY KEY (Id));

```
CREATE TABLE Leg (  
  AirlineID            CHAR(2),  
  FlightNo            INTEGER NOT NULL,  
  LegNo                INTEGER NOT NULL,  
  DepAirportID        CHAR(3) NOT NULL,  
  ArrAirportID        CHAR(3) NOT NULL,  
  ArrTime             DATETIME NOT NULL,  
  DepTime             DATETIME NOT NULL,  
  PRIMARY KEY (AirlineID, FlightNo, LegNo),  
  UNIQUE(AirlineID, FlightNo, DepAirportID),  
  FOREIGN KEY (AirlineID, FlightNo) REFERENCES Flight(AirlineID, FlightNo),  
  FOREIGN KEY (DepAirportID) REFERENCES Airport(Id),  
  FOREIGN KEY (ArrAirportID) REFERENCES Airport(Id),  
  CHECK (LegNo > 0)  
);
```

```
CREATE TABLE Fare (  
  AirlineID            CHAR(2) NOT NULL,  
  FlightNo            INTEGER NOT NULL,  
  FareType            VARCHAR(20) NOT NULL,  
  Class                VARCHAR(20) NOT NULL,  
  Fare                 NUMERIC(10,2) NOT NULL,  
  PRIMARY KEY (AirlineID, FlightNo, FareType, Class),  
  FOREIGN KEY (AirlineID, FlightNo) REFERENCES Flight(AirlineID, FlightNo),  
  CHECK (Fare > 0)  
);
```

```
CREATE TABLE Person (  
  Id                    INTEGER,  
  FirstName            VARCHAR(50) NOT NULL,  
  LastName             VARCHAR(50) NOT NULL,  
  Address              VARCHAR(100) NOT NULL,  
  City                  VARCHAR(50) NOT NULL,  
  State                 VARCHAR(50) NOT NULL,  
  ZipCode              INTEGER NOT NULL,  
  PRIMARY KEY (Id),  
  CHECK (Id > 0),  
  CHECK (ZipCode > 0)
```

);

```
CREATE TABLE Customer (  
  Id                INTEGER NOT NULL,  
  AccountNo         INTEGER,  
  CreditCardNo      CHAR(16),  
  Email             VARCHAR(50),  
  CreationDate      DateTime NOT NULL,  
  Rating            INTEGER,  
  PRIMARY KEY (AccountNo),  
  FOREIGN KEY (Id) REFERENCES Person (Id),  
  CHECK (Rating >= 0 AND Rating <= 10)  
);
```

```
CREATE TABLE CustomerPreferences(  
  AccountNo         INTEGER NOT NULL,  
  Preference        VARCHAR(50) NOT NULL,  
  PRIMARY KEY (AccountNo, Preference),  
  FOREIGN KEY (AccountNo) REFERENCES Customer (AccountNo)  
);
```

```
CREATE TABLE Employee (  
  Id                INTEGER NOT NULL,  
  SSN               INTEGER,  
  IsManager         BOOLEAN NOT NULL,  
  StartDate         DATE NOT NULL,  
  HourlyRate        NUMERIC(10,2) NOT NULL,  
  PRIMARY KEY (SSN),  
  FOREIGN KEY (Id) REFERENCES Person (Id),  
  UNIQUE (Id),  
  CHECK (SSN > 0),  
  CHECK (HourlyRate > 0)  
);
```

```
CREATE TABLE Passenger (  
  Id                INTEGER,  
  AccountNo         INTEGER,  
  PRIMARY KEY (Id, AccountNo),  
  FOREIGN KEY (Id) REFERENCES Person (Id),  
  FOREIGN KEY (AccountNo) REFERENCES Customer (AccountNo),  
);
```

```

CREATE TABLE Reservation (
    ResrNo          INTEGER,
    ResrDate        DATETIME NOT NULL,
    BookingFee      NUMERIC(10,2) NOT NULL,
    TotalFare       NUMERIC(10,2) NOT NULL,
    RepSSN          INTEGER,
    AccountNo       INTEGER NOT NULL,
    PRIMARY KEY (ResrNo),
    FOREIGN KEY (RepSSN) REFERENCES Employee (SSN),
    FOREIGN KEY (AccountNo) REFERENCES Customer (AccountNo),
    CHECK (ResrNo > 0),
    CHECK (BookingFee >= 0),
    CHECK (TotalFare > BookingFee)
);

```

```

CREATE TABLE Includes (
    ResrNo          INTEGER,
    AirlineID       CHAR(2),
    FlightNo        INTEGER,
    LegNo           INTEGER,
    Date            DATE NOT NULL,
    PRIMARY KEY (ResrNo, AirlineID, FlightNo, LegNo),
    FOREIGN KEY (ResrNo) REFERENCES Reservation (ResrNo),
    FOREIGN KEY (AirlineID, FlightNo, LegNo) REFERENCES Leg(AirlineID, FlightNo, LegNo)
);

```

```

CREATE TABLE ReservationPassenger (
    ResrNo          INTEGER,
    Id              INTEGER,
    AccountNo       INTEGER,
    SeatNo          CHAR(5) NOT NULL,
    Class           VARCHAR(20) NOT NULL,
    Meal            VARCHAR(50),
    PRIMARY KEY (ResrNo, Id, AccountNo),
    FOREIGN KEY (ResrNo) REFERENCES Reservation (ResrNo),
    FOREIGN KEY (Id, AccountNo) REFERENCES Passenger (Id, AccountNo)
);

```

```

CREATE TABLE Auctions (
    AccountNo       INTEGER,
    AirlineID       CHAR(2),
    FlightNo        INTEGER,

```

```
Class          VARCHAR(20),
Date           DATETIME,
NYOP           NUMERIC(10,2) NOT NULL,
PRIMARY KEY (AccountNo, AirlineID, FlightNo, Class, Date),
FOREIGN KEY (AccountNo) REFERENCES Customer(AccountNo),
FOREIGN KEY (AirlineID, FlightNo) REFERENCES Flight(AirlineID, FlightNo),
CHECK (NYOP > 0)
);
```

3.1 Manager-Level Transactions

- Add, Edit and Delete information for an employee

For Add:

Insert into Person values(?, ?, ?, ?, ?, ?);

Insert into Employee values(?, ?, ?, ?, ?);

Example:

Person Table - Before

Id	FirstName	LastName	Address	City	State	ZipCode
1	Jane	Smith	100 Nicolls Rd	Stonv Brook	New York	17790
2	John	Doe	123 N Fake Street	New York	New York	10001
3	Rick	Astlev	1337 Internet Lane	Los Angeles	California	90001
4	The	Boss	1234 whatever	Stonv Brook	New York	11790
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Employee Table - Before

Id	SSN	IsManager	StartDate	HourlyRate
4	123456789	1	2010-01-01	15.00
NULL	NULL	NULL	NULL	NULL

INSERT INTO Person values(5, 'Bob', 'Smith', '1001 street', 'New York', 'New York', 11000);

INSERT INTO Employee values(5, 100000001, 0, '2012-01-01 23:00:00', 10.00);

Person Table – After

Id	FirstName	LastName	Address	City	State	ZipCode
1	Jane	Smith	100 Nicolls Rd	Stonv Brook	New York	17790
2	John	Doe	123 N Fake Street	New York	New York	10001
3	Rick	Astlev	1337 Internet Lane	Los Angeles	California	90001
4	The	Boss	1234 whatever	Stonv Brook	New York	11790
5	Bob	Smith	1001 street	New York	New York	11000
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Employee Table – After

Id	SSN	IsManager	StartDate	HourlyRate
5	100000001	0	2012-01-01	10.00
4	123456789	1	2010-01-01	15.00
NULL	NULL	NULL	NULL	NULL

For Edit:

Update Employee

Set HourlyRate = ?

Where Employee.Id = ?;

Example:

Employee Table – Before

Id	SSN	IsManager	StartDate	HourlyRate
5	100000001	0	2012-01-01	10.00
4	123456789	1	2010-01-01	15.00
NULL	NULL	NULL	NULL	NULL

Update Employee

Set HourlyRate = 11.00

Where Employee.Id = 5;

Employee Table – After

Id	SSN	IsManager	StartDate	HourlyRate
5	100000001	0	2012-01-01	11.00
4	123456789	1	2010-01-01	15.00
NULL	NULL	NULL	NULL	NULL

For Delete:

Delete from Employee

Where Employee.id = ?;

Example:

Employee Table – Before

Id	SSN	IsManager	StartDate	HourlyRate
5	100000001	0	2012-01-01	11.00
4	123456789	1	2010-01-01	15.00
NULL	NULL	NULL	NULL	NULL

Delete from Employee

Where Employee.id = 5;

Employee Table – After

Id	SSN	IsManager	StartDate	HourlyRate
4	123456789	1	2010-01-01	15.00
NULL	NULL	NULL	NULL	NULL

- Obtain a sales report for a particular month

Select Month(ResrDate) ,SUM(TotalFare)

From reservation

Where Month(ResrDate) = ?
 Group By Month(ResrDate);

Example:

Select Month(ResrDate) ,SUM(TotalFare)
 From reservation
 Where Month(ResrDate) = 10
 Group By Month(ResrDate);

Month(ResrDate)	SUM(TotalFare)
10	5033.33

- Produce a comprehensive listing of all flights
 SELECT *
 FROM leg

AirlineID	FlightNo	LegNo	DepAirportID	ArrAirportID	ArrTime	DepTime	CurrArrTime	CurrDepTime
AA	111	1	LGA	LAX	2011-01-05 17:00:00	2011-01-05 11:00:00	2011-01-05 17:00:00	2011-01-05 11:00:00
AA	111	2	LAX	TYO	2011-01-06 07:30:00	2011-01-05 19:00:00	2011-01-06 07:30:00	2011-01-05 19:00:00
AM	1337	1	JFK	TNR	2011-01-13 23:00:00	2011-01-13 07:00:00	2011-01-13 23:00:00	2011-01-13 07:00:00
JA	111	1	SFO	BOS	2011-01-10 19:30:00	2011-01-10 14:00:00	2011-01-10 19:30:00	2011-01-10 14:00:00
JA	111	2	BOS	LON	2011-01-11 05:00:00	2011-01-10 22:30:00	2011-01-11 05:00:00	2011-01-10 22:30:00
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

- Produce a list of reservations by flight number or by customer name

Select by Flight number:

SELECT I.FlightNo, R.ResrNo,R.ResrDate,R.BookingFee,R.TotalFare,
 R.RepSSN,R.AccountNo
 From includes I , reservation R
 Where I.ResrNo = R.ResrNo AND I.FlightNo=?
 Group by R.ResrNo

Example:

SELECT I.FlightNo, R.ResrNo,R.ResrDate,R.BookingFee,R.TotalFare,
 R.RepSSN,R.AccountNo
 From includes I , reservation R
 Where I.ResrNo = R.ResrNo AND I.FlightNo=111
 Group by R.ResrNo

FlightNo	ResrNo	ResrDate	BookingFee	TotalFare	RepSSN	AccountNo
111	111	2010-10-10 10:00:00	120.00	1200.00	123456789	102
111	222	2010-10-10 10:00:00	50.00	500.00	123456789	101

Select by Customer name:

Select P.FirstName, P. LastName, R.ResrNo,R.ResrDate,R.BookingFee,R.TotalFare,
R.RepSSN,R.AccountNo
From Person P, reservation R, customer C
Where C.Id = P.Id And C.AccountNo = R.AccountNo AND P.FirstName=? AND
P.LastName=?

Example:

Select P.FirstName, P. LastName, R.ResrNo,R.ResrDate,R.BookingFee,R.TotalFare,
R.RepSSN,R.AccountNo
From Person P, reservation R, customer C
Where C.Id = P.Id And C.AccountNo = R.AccountNo AND P.FirstName='John' AND
P.LastName='Doe';

FirstName	LastName	ResrNo	ResrDate	BookingFee	TotalFare	RepSSN	AccountNo
John	Doe	111	2010-10-10 10:00:00	120.00	1200.00	123456789	102

- Produce a summary listing of revenue generated by a particular flight, destination city, or customer

Particular Flight:

Select I.AirlineID, I.FlightNo, SUM(R.TotalFare)
from includes I, reservation R
where R.ResrNo = I.ResrNo and I.LegNo = 1 AND I.AirlineID = ? AND I.FlightNo= ?
Group by I.AirlineID, I.FlightNo

Example:

Select I.FlightNo, SUM(R.TotalFare)
from includes I, reservation R
where R.ResrNo = I.ResrNo and I.LegNo = 1 AND I.FlightNo = 111
Group by I.FlightNo

FlightNo	SUM(R.TotalFare)
111	1700.00

Customer:

Select AccountNo, SUM(TotalFare)
 From reservation
 Where AccountNo = ?
 Group By(AccountNo)

Example:

Select AccountNo, SUM(TotalFare)
 From reservation
 Where AccountNo = 101
 Group By(AccountNo)

AccountNo	SUM(TotalFare)
101	500.00

Destination City:

SELECT A.Name, SUM(R.TotalFare)
 FROM Airport A, Reservation R, Includes I, Leg L
 WHERE L.ArrAirportId = A.Id and L.AirlineId = I.AirlineId and L.FlightNo =
 I.FlightNo and R.ResrNo = I.ResrNo and L.ArrAirportId = ? and L.legNo = I.LegNo

Example:

SELECT A.Name, SUM(R.TotalFare)
 FROM Airport A, Reservation R, Includes I, Leg L
 WHERE L.ArrAirportId = A.Id and L.AirlineId = I.AirlineId and L.FlightNo =
 I.FlightNo
 and R.ResrNo = I.ResrNo and L.ArrAirportId = 'LAX' and L.legNo = I.LegNo

Name	SUM(R.TotalFare)
Los Angeles International	1200.00

- Determine which customer representative generated most total revenue

SELECT CONCAT(P.FirstName, ' ', P.LastName) AS 'Customer Representative',
 Revenue.MaxTotalRevenue AS 'Most Total Revenue'
 FROM (

```

SELECT Rev.RepSSN AS RepSSN, MAX(Rev.TotalRevenue) AS
MaxTotalRevenue
FROM (
    SELECT R.RepSSN, SUM(R.TotalFare) As TotalRevenue
    FROM Reservation R
    GROUP BY R.RepSSN
) Rev
GROUP BY Rev.RepSSN
) Revenue, Person P, Employee E
WHERE P.Id=E.Id AND E.SSN=Revenue.RepSSN;

```

	Customer Representative	Most Total Revenue
	The Boss	503.33

- Determine which customer generated most total revenue

```

SELECT P.FirstName, P.LastName
FROM Customer C, Person P
WHERE C.AccountNo=(
    select AccountNo
    from reservation
    where BookingFee=(
        select MAX(BookingFee)
        from (SELECT SUM(BookingFee)as BookingFee, AccountNO
              FROM Reservation
              GROUP BY(AccountNo)
             )AS A
    )
)
and P.Id = C.Id

```

FirstName	LastName
Rick	Astlev

- Produce a list of most active flights

```

Select AirlineID, FlightNo , count(*) AS 'Number Of Flights'
from leg
group by AirlineID, FlightNo
having count(*) =
(select max(total)
From (select count(*) as total
from leg
group by AirlineID, FlightNo

```

) as t)

AirlineID	FlightNo	Number Of Flights
AA	111	2
JA	111	2

- Produce a list of all customers who have seats reserved on a given flight

```

Select R.AccountNo, I.FlightNo, I.AirlineID
From includes I, Leg L , reservation R
Where I.ResrNo = R.ResrNo and I.FlightNo = L.FlightNo and
I.AirlineID = L.AirlineID and I.AirlineID =? and I.FlightNo=?
Group by R.AccountNo
Order BY L.AirlineID , L.FlightNo

```

Example:

```

Select R.AccountNo, I.FlightNo, I.AirlineID
From includes I, Leg L , reservation R
Where I.ResrNo = R.ResrNo and I.FlightNo = L.FlightNo and
I.AirlineID = L.AirlineID and I.FlightNo = 111
Group by R.AccountNo
Order BY L.AirlineID , L.FlightNo

```

AccountNo	FlightNo	AirlineID
102	111	AA
101	111	JA

- Produce a list of all flights for a given airport

```

SELECT A.Name AS 'Airport', L.*, F.NoOfSeats, F.DaysOperating,
F.MinLengthOfStay, F.MaxLengthOfStay
FROM Flight F, Leg L, Airport A
WHERE F.FlightNo=L.FlightNo AND F.AirlineID=L.AirlineID
AND (L.DepAirportID=A.Id OR L.ArrAirportID=A.Id)
AND A.Name=?;

```

Example:

```

SELECT A.Name AS 'Airport', L.*, F.NoOfSeats, F.DaysOperating,
F.MinLengthOfStay, F.MaxLengthOfStay
FROM Flight F, Leg L, Airport A
WHERE F.FlightNo=L.FlightNo AND F.AirlineID=L.AirlineID
AND (L.DepAirportID=A.Id OR L.ArrAirportID=A.Id)
AND A.Name='LaGuardia';

```

Airport	AirlineID	FlightNo	LegNo	DepAirportID	ArrAirportID	ArrTime	DepTime	NoOfSeats	DaysOperating	MinLengthOfStay	MaxLengthOfStay
LaGuardia	AA	111	1	LGA	LAX	2011-01-05 17:00:00	2011-01-05 11:00:00	100	1010100	1	2

- Produce a list of all flights whose arrival and departure times are on-time/delayed

```
(SELECT L.*, F.NoOfSeats, F.DaysOperating, F.MinLengthOfStay,
F.MaxLengthOfStay
FROM Flight F, Leg L, Airport A
WHERE F.FlightNo=L.FlightNo AND F.AirlineID=L.AirlineID
AND L.CurrArrTime>=L.ArrTime)
UNION
(SELECT L.*, F.NoOfSeats, F.DaysOperating, F.MinLengthOfStay,
F.MaxLengthOfStay
FROM Flight F, Leg L, Airport A
WHERE F.FlightNo=L.FlightNo AND F.AirlineID=L.AirlineID
AND L.CurrDepTime>=L.DepTime);
```

AirlineID	FlightNo	LegNo	DepAirportID	ArrAirportID	ArrTime	DepTime	CurrArrTime	CurrDepTime	NoOfSeats	DaysOperating	MinLengthOfStay	MaxLengthOfStay
AA	111	1	LGA	LAX	2011-01-05 17:00:00	2011-01-05 11:00:00	2011-01-05 17:00:00	2011-01-05 11:00:00	100	1010100	1	2
AA	111	2	LAX	TYO	2011-01-06 07:30:00	2011-01-05 19:00:00	2011-01-06 07:30:00	2011-01-05 19:00:00	100	1010100	1	2
AM	1337	1	JFK	TNR	2011-01-13 23:00:00	2011-01-13 07:00:00	2011-01-13 23:00:00	2011-01-13 07:00:00	33	1010100	1	2
JA	111	1	SFO	BOS	2011-01-10 19:30:00	2011-01-10 14:00:00	2011-01-10 19:30:00	2011-01-10 14:00:00	150	1111111	1	2
JA	111	2	BOS	LON	2011-01-11 05:00:00	2011-01-10 22:30:00	2011-01-11 05:00:00	2011-01-10 22:30:00	150	1111111	1	2

3.2 Customer-Representative-Level Transactions

- Record a reservation

```
INSERT into Reservation values(?, ?, ?, ?, ?, ?);
INSERT into Includes values(?, ?, ?, ?, ?);
INSERT into person values(?, ?, ?, ?, ?, ?, ?);
INSERT into Passenger values(?, ?)
INSERT into ReservationPassenger values(?, ?, ?, ?, ?, ?);
```

Example:

Reservation Table – Before

ResrNo	ResrDate	BookingFee	TotalFare	RepSSN	AccountNo
111	2010-10-10 10:00:00	120.00	1200.00	123456789	102
222	2010-10-10 10:00:00	50.00	500.00	123456789	101
333	2010-10-10 10:00:00	333.33	3333.33	123456789	103
NULL	NULL	NULL	NULL	NULL	NULL

Includes Table – Before

ResrNo	AirlineID	FlightNo	LegNo	Date
111	AA	111	1	2011-01-05
111	AA	111	2	2011-01-05
222	JA	111	1	2011-01-14
333	AM	1337	1	2011-01-13
NULL	NULL	NULL	NULL	NULL

Person Table – Before

Id	FirstName	LastName	Address	City	State	ZipCode
1	Jane	Smith	100 Nicolls Rd	Stony Brook	New York	17790
2	John	Doe	123 N Fake Street	New York	New York	10001
3	Rick	Astley	1337 Internet Lane	Los Angeles	California	90001
4	The	Boss	1234 whatever	Stony Brook	New York	11790
5	Bob	Smith	1001 street	New York	New York	11000
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Passenger Table – Before

Id	AccountNo
1	101
2	102
3	103
NULL	NULL

ReservationPassenger Table – Before

ResrNo	Id	AccountNo	SeatNo	Class	Meal
111	2	102	33F	Economy	Chips
222	1	101	13A	First	Fish and Chips
333	3	103	1A	First	Sushi
NULL	NULL	NULL	NULL	NULL	NULL

INSERT into Reservation values(334,
'2010-10-10 10:00:00', 333.33, 3333.33, 123456789, 103);
INSERT into Includes values (334,'AM',1337,1,'2011-01-13 07:00:00');
INSERT into person values(6,'Jack','Astley','1337 Internet Lane', 'Los Angeles',
'California', 90001);
INSERT into Passenger values(6,103);
INSERT into ReservationPassenger values(334,6,103,'1A','First','Sushi');

Reservation Table – After

ResrNo	ResrDate	BookingFee	TotalFare	RepSSN	AccountNo
111	2010-10-10 10:00:00	120.00	1200.00	123456789	102
222	2010-10-10 10:00:00	50.00	500.00	123456789	101
333	2010-10-10 10:00:00	333.33	3333.33	123456789	103
334	2010-10-10 10:00:00	333.33	3333.33	123456789	103
NULL	NULL	NULL	NULL	NULL	NULL

Includes Table – After

ResrNo	AirlineID	FlightNo	LegNo	Date
111	AA	111	1	2011-01-05
111	AA	111	2	2011-01-05
222	JA	111	1	2011-01-14
333	AM	1337	1	2011-01-13
334	AM	1337	1	2011-01-13
NULL	NULL	NULL	NULL	NULL

Person Table – After

Id	FirstName	LastName	Address	City	State	ZipCode
1	Jane	Smith	100 Nicolls Rd	Stony Brook	New York	11790
2	John	Doe	123 N Fake Street	New York	New York	10001
3	Rick	Astley	1337 Internet Lane	Los Angeles	California	90001
4	The	Boss	1234 whatever	Stony Brook	New York	11790
5	Bob	Smith	1001 street	New York	New York	11000
6	Jack	Astley	1337 Internet Lane	Los Angeles	California	90001
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Passenger Table – After

Id	AccountNo
1	101
2	102
3	103
6	103
NULL	NULL

ReservationPassenger Table – After

ResrNo	Id	AccountNo	SeatNo	Class	Meal
111	2	102	33F	Economy	Chips
222	1	101	13A	First	Fish and Chips
333	3	103	1A	First	Sushi
334	6	103	1A	First	Sushi
NULL	NULL	NULL	NULL	NULL	NULL

- Add, Edit and Delete information for a customer

Add (extra passenger to reservation):

INSERT into person values(?, ?, ?, ?, ?, ?, ?);

INSERT into Passenger values(?, ?)

INSERT into ReservationPassenger values(?, ?, ?, ?, ?, ?);

Example:

Person Table – Before

Id	FirstName	LastName	Address	City	State	ZipCode
1	Jane	Smith	100 Nicolls Rd	Stony Brook	New York	17790
2	John	Doe	123 N Fake Street	New York	New York	10001
3	Rick	Astley	1337 Internet Lane	Los Angeles	California	90001
4	The	Boss	1234 whatever	Stony Brook	New York	11790
5	Bob	Smith	1001 street	New York	New York	11000
6	Jack	Astley	1337 Internet Lane	Los Angeles	California	90001
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Passenger Table – Before

Id	AccountNo
1	101
2	102
3	103
6	103
NULL	NULL

ReservationPassenger Table – Before

ResrNo	Id	AccountNo	SeatNo	Class	Meal
111	2	102	33F	Economy	Chips
222	1	101	13A	First	Fish and Chips
333	3	103	1A	First	Sushi
334	6	103	1A	First	Sushi
NULL	NULL	NULL	NULL	NULL	NULL

INSERT into person values(7,'Bob','Astley','1337 Internet Lane', 'Los Angeles', 'California', 90001);

INSERT into Passenger values(7,103);

INSERT into ReservationPassenger values(334,7,103,'1A','First','Sushi');

Person Table – After

Id	FirstName	LastName	Address	City	State	ZipCode
1	Jane	Smith	100 Nicolls Rd	Stony Brook	New York	17790
2	John	Doe	123 N Fake Street	New York	New York	10001
3	Rick	Astley	1337 Internet Lane	Los Angeles	California	90001
4	The	Boss	1234 whatever	Stony Brook	New York	11790
5	Bob	Smith	1001 street	New York	New York	11000
6	Jack	Astley	1337 Internet Lane	Los Angeles	California	90001
7	Bob	Astley	1337 Internet Lane	Los Angeles	California	90001
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Passenger Table – After

Id	AccountNo
1	101
2	102
3	103
6	103
7	103
NULL	NULL

ReservationPassenger Table – After

ResrNo	Id	AccountNo	SeatNo	Class	Meal
111	2	102	33F	Economv	Chios
222	1	101	13A	First	Fish and Chios
333	3	103	1A	First	Sushi
334	6	103	1A	First	Sushi
334	7	103	1A	First	Sushi
NULL	NULL	NULL	NULL	NULL	NULL

Edit (seat number, class, meal, address, city, state, zipcode, email, credit card):

UPDATE ReservationPassenger SET SeatNo=? WHERE ResrNo=? AND Id=?
AND AccountNo=?;

UPDATE ReservationPassenger SET Class=? WHERE ResrNo=? AND Id=?
AND AccountNo=?;

UPDATE ReservationPassenger SET Meal=? WHERE ResrNo=? AND Id=?
AND AccountNo=?;

UPDATE Person SET Address=? Lane' WHERE Id=?;

UPDATE Person SET City=? WHERE Id=?;

UPDATE Person SET State=? WHERE Id=?;

UPDATE Person SET ZipCode=? WHERE Id=?;

UPDATE Customer SET Email=? WHERE Id=?;

UPDATE Customer SET CreditCardNo=? WHERE Id=?;

Example:

ReservationPassenger Table – Before

ResrNo	Id	AccountNo	SeatNo	Class	Meal
111	2	102	33F	Economv	Chios
222	1	101	13A	First	Fish and Chios
333	3	103	1A	First	Sushi
334	6	103	1A	First	Sushi
334	7	103	1A	First	Sushi
NULL	NULL	NULL	NULL	NULL	NULL

Person Table – Before

Id	FirstName	LastName	Address	City	State	ZipCode
1	Jane	Smith	100 Nicolls Rd	Stony Brook	New York	11790
2	John	Doe	123 N Fake Street	New York	New York	10001
3	Rick	Astley	1337 Internet Lane	Los Angeles	California	90001
4	The	Boss	1234 whatever	Stony Brook	New York	11790
5	Bob	Smith	1001 street	New York	New York	11000
6	Jack	Astley	1337 Internet Lane	Los Angeles	California	90001
7	Bob	Astley	1337 Internet Lane	Los Angeles	California	90001
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Customer Table – Before

Id	AccountNo	CreditCardNo	Email	CreationDate	Rating
1	101	0000000000000001	awesomeiane@ftw.com	2010-10-01 09:00:00	0
2	102	0000000000000002	idoe@woot.com	2010-09-01 09:00:00	0
3	103	0000000000000003	rickroller@rolld.com	2010-08-01 09:00:00	0
NULL	NULL	NULL	NULL	NULL	NULL

UPDATE ReservationPassenger SET SeatNo='1B' WHERE ResrNo=333 AND Id=3
AND AccountNo=103;

UPDATE ReservationPassenger SET Class='Second' WHERE ResrNo=333 AND Id=3
AND AccountNo=103;

UPDATE ReservationPassenger SET Meal='Chips' WHERE ResrNo=333 AND Id=3
AND AccountNo=103;

UPDATE Person SET Address='1338 Internet Lane' WHERE Id=3;

UPDATE Person SET City='New York' WHERE Id=3;

UPDATE Person SET State='New York' WHERE Id=3;

UPDATE Person SET ZipCode=11001 WHERE Id=3;

UPDATE Customer SET Email='rr@rolld.com' WHERE Id=3;

UPDATE Customer SET CreditCardNo='1234123412341234' WHERE Id=3;

ReservationPassenger Table – After

ResrNo	Id	AccountNo	SeatNo	Class	Meal
111	2	102	33F	Economy	Chips
222	1	101	13A	First	Fish and Chips
333	3	103	1B	Second	Chips
334	6	103	1A	First	Sushi
334	7	103	1A	First	Sushi
NULL	NULL	NULL	NULL	NULL	NULL

Person Table – After

Id	FirstName	LastName	Address	City	State	ZipCode
1	Jane	Smith	100 Nicolls Rd	Stony Brook	New York	11790
2	John	Doe	123 N Fake Street	New York	New York	10001
3	Rick	Astlev	1338 Internet Lane	New York	New York	11001
4	The	Boss	1234 whatever	Stony Brook	New York	11790
5	Bob	Smith	1001 street	New York	New York	11000
6	Jack	Astlev	1337 Internet Lane	Los Angeles	California	90001
7	Bob	Astlev	1337 Internet Lane	Los Angeles	California	90001
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Customer Table – After

Id	AccountNo	CreditCardNo	Email	CreationDate	Rating
1	101	00000000000000000001	awesomeiane@ftw.com	2010-10-01 09:00:00	0
2	102	00000000000000000002	idoe@woot.com	2010-09-01 09:00:00	0
3	103	1234123412341234	rr@rolld.com	2010-08-01 09:00:00	0
NULL	NULL	NULL	NULL	NULL	NULL

Delete (Removing passenger):

DELETE FROM ReservationPassenger WHERE ResrNo=? AND Id=? AND AccountNo=?;

DELETE FROM Passenger WHERE Id=? and AccountNo=?;

DELETE FROM Person WHERE Id=?;

Example:

ReservationPassenger Table – Before

ResrNo	Id	AccountNo	SeatNo	Class	Meal
111	2	102	33F	Economv	Chips
222	1	101	13A	First	Fish and Chips
333	3	103	1B	Second	Chips
334	6	103	1A	First	Sushi
334	7	103	1A	First	Sushi
NULL	NULL	NULL	NULL	NULL	NULL

Passenger Table – Before

Id	AccountNo
1	101
2	102
3	103
6	103
7	103
NULL	NULL

Person Table – Before

Id	FirstName	LastName	Address	City	State	ZipCode
1	Jane	Smith	100 Nicolls Rd	Stony Brook	New York	11790
2	John	Doe	123 N Fake Street	New York	New York	10001
3	Rick	Astlev	1338 Internet Lane	New York	New York	11001
4	The	Boss	1234 whatever	Stony Brook	New York	11790
5	Bob	Smith	1001 street	New York	New York	11000
6	Jack	Astlev	1337 Internet Lane	Los Angeles	California	90001
7	Bob	Astlev	1337 Internet Lane	Los Angeles	California	90001
NULL	NULL	NULL	NULL	NULL	NULL	NULL

DELETE FROM ReservationPassenger WHERE ResrNo=334 AND Id=7 AND AccountNo=103;
DELETE FROM Passenger WHERE Id=7 and AccountNo=103;
DELETE FROM Person WHERE Id=7;

ReservationPassenger Table – After

ResrNo	Id	AccountNo	SeatNo	Class	Meal
111	2	102	33F	Economy	Chips
222	1	101	13A	First	Fish and Chips
333	3	103	1B	Second	Chips
334	6	103	1A	First	Sushi
NULL	NULL	NULL	NULL	NULL	NULL

Passenger Table – After

Id	AccountNo
1	101
2	102
3	103
6	103
NULL	NULL

Person Table – After

Id	FirstName	LastName	Address	City	State	ZipCode
1	Jane	Smith	100 Nicolls Rd	Stony Brook	New York	11790
2	John	Doe	123 N Fake Street	New York	New York	10001
3	Rick	Astlev	1338 Internet Lane	New York	New York	11001
4	The	Boss	1234 whatever	Stony Brook	New York	11790
5	Bob	Smith	1001 street	New York	New York	11000
6	Jack	Astlev	1337 Internet Lane	Los Angeles	California	90001
NULL	NULL	NULL	NULL	NULL	NULL	NULL

- Produce customer mailing lists

```
Select P.FirstName, P.LastName, P.Address, P.City, P.State, P.ZipCode
From Customer C, Person P
Where P.Id = C.Id;
```

FirstName	LastName	Address	City	State	ZipCode
Jane	Smith	100 Nicolls Rd	Stony Brook	New York	11790
John	Doe	123 N Fake Street	New York	New York	10001
Rick	Astley	1338 Internet Lane	New York	New York	11001

- Produce a list of flight suggestions for a given customer (based on that customer's past reservations)

Flight suggestions based on airlines that the customer took in the past

```
SELECT L.*, F.NoOfSeats, F.DaysOperating, F.MinLengthOfStay, F.MaxLengthOfStay
FROM Flight F, Leg L
WHERE F.FlightNo=L.FlightNo AND F.AirlineID=L.AirlineID AND
L.CurrArrTime>NOW() AND L.CurrDepTime>NOW()
AND F.AirlineID IN (
    Select Ic.AirlineID
    FROM Reservation R, Includes Ic
    WHERE R.AccountNo=? AND R.ResrNo=Ic.ResrNo
    AND NOW() > (
        SELECT MAX(L.DepTime)
        FROM Leg L, Includes I
        WHERE I.ResrNo=R.ResrNo AND I.AirlineID=L.AirlineID AND
        I.FlightNo=L.FlightNo
    )
);
```

Example:

Note that the arrival and departure times values in WHERE clause are hardcoded to display flights

```
SELECT L.*, F.NoOfSeats, F.DaysOperating, F.MinLengthOfStay, F.MaxLengthOfStay
```



```

FROM Flight F, Leg L
WHERE F.FlightNo=L.FlightNo AND F.AirlineID=L.AirlineID AND
L.CurrArrTime>'2011-01-05 17:00:00' AND L.CurrDepTime>'2011-01-05 17:00:00'
AND F.AirlineID IN (
    Select Ic.AirlineID
    FROM Reservation R, Includes Ic
    WHERE R.AccountNo=101 AND R.ResrNo=Ic.ResrNo
    AND NOW() > (
        SELECT MAX(L.DepTime)
        FROM Leg L, Includes I
        WHERE I.ResrNo=R.ResrNo AND I.AirlineID=L.AirlineID AND
        I.FlightNo=L.FlightNo
    )
);

```

AirlineID	FlightNo	LegNo	DepAirportID	ArrAirportID	ArrTime	DepTime	CurrArrTime	CurrDepTime	NoOfSeats	DaysOperating	MinLengthOfStay	MaxLengthOfStay
JA	111	1	SFO	BOS	2011-01-10 19:30:00	2011-01-10 14:00:00	2011-01-10 19:30:00	2011-01-10 14:00:00	150	1111111	1	2
JA	111	2	BOS	LON	2011-01-11 05:00:00	2011-01-10 22:30:00	2011-01-11 05:00:00	2011-01-10 22:30:00	150	1111111	1	2

3.3 Customer-Level Transactions

Customers should be thought of as online airline ticket buyers and should be able to easily browse your online travel reservation system on the web and make flight reservations. In particular, they should be able to make the following types of reservations:

- One-Way

INSERT into Reservation Values(?, ?, ?, ?, ?, ?)

INSERT into Includes Values(?, ?, ?, ?, ?)

Example:

Note that the following INSERT statements are the demo data so they are already in the table. Therefore, there is no before and after tables because of duplicate entries.

Leg Table – Given

AirlineID	FlightNo	LegNo	DepAirportID	ArrAirportID	ArrTime	DepTime	CurrArrTime	CurrDepTime
AA	111	1	LGA	LAX	2011-01-05 17:00:00	2011-01-05 11:00:00	2011-01-05 17:00:00	2011-01-05 11:00:00
AA	111	2	LAX	TYO	2011-01-06 07:30:00	2011-01-05 19:00:00	2011-01-06 07:30:00	2011-01-05 19:00:00
AM	1337	1	JFK	TNR	2011-01-13 23:00:00	2011-01-13 07:00:00	2011-01-13 23:00:00	2011-01-13 07:00:00
JA	111	1	SFO	BOS	2011-01-10 19:30:00	2011-01-10 14:00:00	2011-01-10 19:30:00	2011-01-10 14:00:00
JA	111	2	BOS	LON	2011-01-11 05:00:00	2011-01-10 22:30:00	2011-01-11 05:00:00	2011-01-10 22:30:00
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

From seeing the legs, customer reserves a One-Way Trip with flight 111 in American Airline.

```

INSERT into Reservation Values(111,
'2010-10-10 10:00:00',120.00,1200.00,123456789,102);
INSERT into Includes Values(111,'AA',111,1,'2011-01-05 11:00:00');
INSERT into Includes values (111,'AA',111,2,'2011-01-05 19:00:00');

```

Reservation Table

ResrNo	ResrDate	BookingFee	TotalFare	RepSSN	AccountNo
111	2010-10-10 10:00:00	120.00	1200.00	123456789	102
222	2010-10-10 10:00:00	50.00	500.00	123456789	101
333	2010-10-10 10:00:00	333.33	3333.33	123456789	103
334	2010-10-10 10:00:00	333.33	3333.33	123456789	103
NULL	NULL	NULL	NULL	NULL	NULL

Includes Table

ResrNo	AirlineID	FlightNo	LegNo	Date
111	AA	111	1	2011-01-05
111	AA	111	2	2011-01-05
222	JA	111	1	2011-01-14
333	AM	1337	1	2011-01-13
334	AM	1337	1	2011-01-13
NULL	NULL	NULL	NULL	NULL

- Round-Trip

```

INSERT into Reservation Values(?, ?, ?, ?, ?, ?);
INSERT into Includes Values(?, ?, ?, ?, ?);
INSERT into Includes Values(?, ?, ?, ?, ?);

```

Example:

Leg

```

INSERT into Leg Values('JA',112,1,'LGA','TYO','2011-01-15 15:00:00','2011-01-15
12:00:00','2011-01-15 15:00:00','2011-01-15 12:00:00');
INSERT into Leg Values('JA',113,1, 'TYO', 'LGA', '2011-01-18 10:00:00', '2011-01-18
8:00:00', '2011-01-18 10:00:00', '2011-01-18 8:00:00');
INSERT into Reservation Values(666, '2011-01-14
12:00:00',20.00,200.00,123456789,102);
INSERT into Includes Values(666, 'JA',112,1, '2011-01-15 12:00:00');
INSERT into Includes Values(666, 'JA ',113,1, '2011-01-18 8:00:00');

```

For this question we insert the new data to better demonstrate the round trip.

After customer see the leg they can make reservation with id 666

the leg table:

AirlineID	FlightNo	LegNo	DepAirportID	ArrAirportID	ArrTime	DepTime	CurrArrTime	CurrDepTime
AA	111	1	LGA	LAX	2011-01-05 17:00:00	2011-01-05 11:00:00	2011-01-05 17:00:00	2011-01-05 11:00:00
AA	111	2	LAX	TYO	2011-01-06 07:30:00	2011-01-05 19:00:00	2011-01-06 07:30:00	2011-01-05 19:00:00
AA	555	1	LGA	LAX	2011-01-05 18:00:00	2011-01-05 12:00:00	2011-01-05 18:00:00	2011-01-05 12:00:00
AM	1337	1	JFK	TNR	2011-01-13 23:00:00	2011-01-13 07:00:00	2011-01-13 23:00:00	2011-01-13 07:00:00
JA	111	1	SFO	BOS	2011-01-10 19:30:00	2011-01-10 14:00:00	2011-01-10 19:30:00	2011-01-10 14:00:00
JA	111	2	BOS	LON	2011-01-11 05:00:00	2011-01-10 22:30:00	2011-01-11 05:00:00	2011-01-10 22:30:00
JA	112	1	LGA	TYO	2011-01-15 15:00:00	2011-01-15 12:00:00	2011-01-15 15:00:00	2011-01-15 12:00:00
JA	113	1	TYO	LGA	2011-01-18 10:00:00	2011-01-18 08:00:00	2011-01-18 10:00:00	2011-01-18 08:00:00

The reservation:

ResrNo	ResrDate	BookingFee	TotalFare	RepSSN	AccountNo
111	2010-10-10 10:00:00	120.00	1200.00	123456789	102
222	2010-10-10 10:00:00	50.00	500.00	123456789	101
333	2010-10-10 10:00:00	333.33	3333.33	123456789	103
444	2011-01-14 12:00:00	60.00	200.00	123456789	102
555	2010-10-10 10:00:00	120.00	1200.00	123456789	102
666	2011-01-14 12:00:00	20.00	200.00	123456789	102

The Includes:

ResrNo	AirlineID	FlightNo	LegNo	Date
111	AA	111	1	2011-01-05 11:00:00
111	AA	111	2	2011-01-05 19:00:00
222	JA	111	1	2011-01-14 22:30:00
333	AM	1337	1	2011-01-13 07:00:00
444	JA	111	1	2011-01-15 12:00:00
555	AA	555	1	2011-01-05 12:00:00
666	JA	112	1	2011-01-15 12:00:00
666	JA	113	1	2011-01-18 08:00:00

- Multi-City

INSERT into Reservation Values(?, ?, ?, ?, ?, ?);

INSERT into Includes Values(?, ?, ?, ?, ?);

INSERT into Includes Values(?, ?, ?, ?, ?);

Example:

Note that the following INSERT statements are the demo data so they are already in the table. Therefore, there is no before and after tables because of duplicate entries.

Leg Table - Given

AirlineID	FlightNo	LegNo	DepAirportID	ArrAirportID	ArrTime	DepTime	CurrArrTime	CurrDepTime
AA	111	1	LGA	LAX	2011-01-05 17:00:00	2011-01-05 11:00:00	2011-01-05 17:00:00	2011-01-05 11:00:00
AA	111	2	LAX	TYO	2011-01-06 07:30:00	2011-01-05 19:00:00	2011-01-06 07:30:00	2011-01-05 19:00:00
AM	1337	1	JFK	TNR	2011-01-13 23:00:00	2011-01-13 07:00:00	2011-01-13 23:00:00	2011-01-13 07:00:00
JA	111	1	SFO	BOS	2011-01-10 19:30:00	2011-01-10 14:00:00	2011-01-10 19:30:00	2011-01-10 14:00:00
JA	111	2	BOS	LON	2011-01-11 05:00:00	2011-01-10 22:30:00	2011-01-11 05:00:00	2011-01-10 22:30:00
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

From seeing the legs, customer reserves a Multi-City Trip with flight 111 in American Airline. Customer decides to do a few hour sight side at night at Los Angeles.

INSERT into Reservation Values(111,'2010-10-10

10:00:00',120.00,1200.00,123456789,102);

INSERT into Includes values (111,'AA',111,1,'2011-01-05 11:00:00');

INSERT into Includes values (111,'AA',111,2,'2011-01-05 19:00:00');

Reservation Table

ResrNo	ResrDate	BookingFee	TotalFare	RepSSN	AccountNo
111	2010-10-10 10:00:00	120.00	1200.00	123456789	102
222	2010-10-10 10:00:00	50.00	500.00	123456789	101
333	2010-10-10 10:00:00	333.33	3333.33	123456789	103
334	2010-10-10 10:00:00	333.33	3333.33	123456789	103
NULL	NULL	NULL	NULL	NULL	NULL

Includes Table

ResrNo	AirlineID	FlightNo	LegNo	Date
111	AA	111	1	2011-01-05
111	AA	111	2	2011-01-05
222	JA	111	1	2011-01-14
333	AM	1337	1	2011-01-13
334	AM	1337	1	2011-01-13
NULL	NULL	NULL	NULL	NULL

- Domestic or International

INSERT into Leg Values(?, ?, ?, ?, ?, ?, ?, ?, ?);

INSERT into Reservation Values(?, ?, ?, ?, ?, ?);

INSERT into Includes Values(?, ?, ?, ?, ?);

Domestic - Example

From seeing leg the customer reserve a domestic flight with 555 in American Airline

- please note that the following data is added on top of demo data to show more clarity .

AirlineID	FlightNo	LegNo	DepAirportID	ArrAirportID	ArrTime	DepTime	CurrArrTime	CurrDepTime
AA	111	1	LGA	LAX	2011-01-05 17:00:00	2011-01-05 11:00:00	2011-01-05 17:00:00	2011-01-05 11:00:00
AA	111	2	LAX	TYO	2011-01-06 07:30:00	2011-01-05 19:00:00	2011-01-06 07:30:00	2011-01-05 19:00:00
▶ AA	555	1	LGA	LAX	2011-01-05 18:00:00	2011-01-05 12:00:00	2011-01-05 18:00:00	2011-01-05 12:00:00
AM	1337	1	JFK	TNR	2011-01-13 23:00:00	2011-01-13 07:00:00	2011-01-13 23:00:00	2011-01-13 07:00:00
JA	111	1	SFO	BOS	2011-01-10 19:30:00	2011-01-10 14:00:00	2011-01-10 19:30:00	2011-01-10 14:00:00
JA	111	2	BOS	LON	2011-01-11 05:00:00	2011-01-10 22:30:00	2011-01-11 05:00:00	2011-01-10 22:30:00

INSERT into Leg Values('AA',555,1,'LGA','LAX','2011-01-05 17:00:00', '2011-01-05 11:00:00', '2011-01-05 17:00:00', '2011-01-05 12:00:00');
INSERT into Reservation Values(555,'2010-10-10 10:00:00',120.00,1200.00,123456789,102);
INSERT into Includes values (555,'AA',555,1,'2011-01-05 12:00:00');

Reservation Table:

ResrNo	ResrDate	BookingFee	TotalFare	RepSSN	AccountNo
▶ 111	2010-10-10 10:00:00	120.00	1200.00	123456789	102
222	2010-10-10 10:00:00	50.00	500.00	123456789	101
333	2010-10-10 10:00:00	333.33	3333.33	123456789	103
555	2010-10-10 10:00:00	120.00	1200.00	123456789	102

Includes Table

ResrNo	AirlineID	FlightNo	LegNo	Date
111	AA	111	1	2011-01-05 11:00:00
111	AA	111	2	2011-01-05 19:00:00
222	JA	111	1	2011-01-14 22:30:00
333	AM	1337	1	2011-01-13 07:00:00
555	AA	555	1	2011-01-05 12:00:00

International - Example

INSERT into Reservation Values(444, '2011-01-14 12:00:00',60.00,200.00,123456789,102)
INSERT into Includes Values(444, 'JA',111,1, '2011-01-15 12:00:00')

From seeing a International flight to japan a customer reserve a flight. This is the demo data given to us

Leg:

AirlineID	FlightNo	LegNo	DepAirportID	ArrAirportID	ArrTime	DepTime	CurrArrTime	CurrDepTime
AA	111	1	LGA	LAX	2011-01-05 17:00:00	2011-01-05 11:00:00	2011-01-05 17:00:00	2011-01-05 11:00:00
AA	111	2	LAX	TYO	2011-01-06 07:30:00	2011-01-05 19:00:00	2011-01-06 07:30:00	2011-01-05 19:00:00
▶ AA	555	1	LGA	LAX	2011-01-05 18:00:00	2011-01-05 12:00:00	2011-01-05 18:00:00	2011-01-05 12:00:00
AM	1337	1	JFK	TNR	2011-01-13 23:00:00	2011-01-13 07:00:00	2011-01-13 23:00:00	2011-01-13 07:00:00
JA	111	1	SFO	BOS	2011-01-10 19:30:00	2011-01-10 14:00:00	2011-01-10 19:30:00	2011-01-10 14:00:00
JA	111	2	BOS	LON	2011-01-11 05:00:00	2011-01-10 22:30:00	2011-01-11 05:00:00	2011-01-10 22:30:00

Reservation Table:

ResrNo	ResrDate	BookingFee	TotalFare	RepSSN	AccountNo
111	2010-10-10 10:00:00	120.00	1200.00	123456789	102
222	2010-10-10 10:00:00	50.00	500.00	123456789	101
333	2010-10-10 10:00:00	333.33	3333.33	123456789	103
444	2011-01-14 12:00:00	60.00	200.00	123456789	102
555	2010-10-10 10:00:00	120.00	1200.00	123456789	102

Includes Table:

ResrNo	AirlineID	FlightNo	LegNo	Date
111	AA	111	1	2011-01-05 11:00:00
111	AA	111	2	2011-01-05 19:00:00
222	JA	111	1	2011-01-14 22:30:00
333	AM	1337	1	2011-01-13 07:00:00
444	JA	111	1	2011-01-15 12:00:00
555	AA	555	1	2011-01-05 12:00:00

- Flexible Date/time

```
SELECT AirlineId, FlightNo, DepAirportId, ArrAirportId, ArrTime, DepTime
FROM Leg
WHERE DepAirportId = ? and ArrAirportId = ? and DepTime BETWEEN ? AND ?;
```

Based on what the customer picks from the SELECT Query, we create the reservation:

```
INSERT into Reservation Values(?, ?, ?, ?, ?, ?);
INSERT into Includes Values(?, ?, ?, ?, ?);
```

Example:

*Note that the example is part of the demo data so they are already in the table.
Therefore, there is no before and after tables because of duplicate entries.*

Customer gives us a range: 2011-01-03 to 2011-01-20 Anytime From LGA to LAX

```
SELECT AirlineId, FlightNo, DepAirportId, ArrAirportId, ArrTime, DepTime
FROM Leg
WHERE DepAirportId = 'LGA' and ArrAirportId = 'LAX' and DepTime BETWEEN
'2011-01-03 00:00:00' AND '2011-01-20 00:00:00';
```

AirlineId	FlightNo	DepAirportId	ArrAirportId	ArrTime	DepTime
AA	111	LGA	LAX	2011-01-05 17:00:00	2011-01-05 11:00:00

Create Reservation based on what the customer picks:

```
INSERT into Reservation Values(111,'2010-10-10
10:00:00',120.00,1200.00,123456789,102);
```

INSERT into Includes values (111,'AA',111,1,'2011-01-05 11:00:00');

Reservation Table

ResrNo	ResrDate	BookingFee	TotalFare	RepSSN	AccountNo
111	2010-10-10 10:00:00	120.00	1200.00	123456789	102
222	2010-10-10 10:00:00	50.00	500.00	123456789	101
333	2010-10-10 10:00:00	333.33	3333.33	123456789	103
334	2010-10-10 10:00:00	333.33	3333.33	123456789	103
NULL	NULL	NULL	NULL	NULL	NULL

Includes Table

ResrNo	AirlineID	FlightNo	LegNo	Date
111	AA	111	1	2011-01-05
111	AA	111	2	2011-01-05
222	JA	111	1	2011-01-14
333	AM	1337	1	2011-01-13
334	AM	1337	1	2011-01-13
NULL	NULL	NULL	NULL	NULL

A customer should also be able to **cancel an existing reservation** and partake in reverse auctions. While they will not be permitted to access the database directly, they should be able to retrieve the following information:

- Cancel Existing Reservation

DELETE FROM Includes WHERE ResrNo=?;
DELETE FROM ReservationPassenger WHERE ResrNo=?;
DELETE FROM Reservation WHERE ResrNo=?;

Example:

Includes Table – Before

ResrNo	AirlineID	FlightNo	LegNo	Date
111	AA	111	1	2011-01-05
111	AA	111	2	2011-01-05
222	JA	111	1	2011-01-14
333	AM	1337	1	2011-01-13
334	AM	1337	1	2011-01-13
NULL	NULL	NULL	NULL	NULL

ReservationPassenger Table – Before

ResrNo	Id	AccountNo	SeatNo	Class	Meal
111	2	102	33F	Economv	Chios
222	1	101	13A	First	Fish and Chios
333	3	103	1B	Second	Chios
334	6	103	1A	First	Sushi
NULL	NULL	NULL	NULL	NULL	NULL

Reservation Table – Before

ResrNo	ResrDate	BookingFee	TotalFare	RepSSN	AccountNo
111	2010-10-10 10:00:00	120.00	1200.00	123456789	102
222	2010-10-10 10:00:00	50.00	500.00	123456789	101
333	2010-10-10 10:00:00	333.33	3333.33	123456789	103
334	2010-10-10 10:00:00	333.33	3333.33	123456789	103
NULL	NULL	NULL	NULL	NULL	NULL

DELETE FROM Includes WHERE ResrNo=334;
DELETE FROM ReservationPassenger WHERE ResrNo=334;
DELETE FROM Reservation WHERE ResrNo=334;

Includes Table – After

ResrNo	AirlineID	FlightNo	LegNo	Date
111	AA	111	1	2011-01-05
111	AA	111	2	2011-01-05
222	JA	111	1	2011-01-14
333	AM	1337	1	2011-01-13
NULL	NULL	NULL	NULL	NULL

ReservationPassenger Table – After

ResrNo	Id	AccountNo	SeatNo	Class	Meal
111	2	102	33F	Economv	Chios
222	1	101	13A	First	Fish and Chios
333	3	103	1B	Second	Chios
NULL	NULL	NULL	NULL	NULL	NULL

Reservation Table – After

ResrNo	ResrDate	BookingFee	TotalFare	RepSSN	AccountNo
111	2010-10-10 10:00:00	120.00	1200.00	123456789	102
222	2010-10-10 10:00:00	50.00	500.00	123456789	101
333	2010-10-10 10:00:00	333.33	3333.33	123456789	103
NULL	NULL	NULL	NULL	NULL	NULL

- A customer's current reservations

SELECT R.ResrNo, R.ResrDate, R.BookingFee, R.TotalFare
FROM Reservation R, Customer C
WHERE R.AccountNo = C.AccountNo and C.AccountNo = ?

Example:

SELECT R.ResrNo, R.ResrDate, R.BookingFee, R.TotalFare
FROM Reservation R, Customer C
WHERE R.AccountNo = C.AccountNo and C.AccountNo = 102

ResrNo	ResrDate	BookingFee	TotalFare
111	2010-10-10 10:00:00	120.00	1200.00

- Travel itinerary for a given reservation

```
SELECT DISTINCT CONCAT(P.FirstName, ' ', P.LastName) AS 'Passenger',
RP.SeatNo, RP.Class, RP.Meal, L.*
FROM Leg L, Includes I, ReservationPassenger RP, Person P
WHERE I.FlightNo=L.FlightNo AND I.AirlineID=L.AirlineID
AND RP.ResrNo=? AND RP.ResrNo=I.ResrNo AND P.Id=RP.Id;
```

Example:

```
SELECT DISTINCT CONCAT(P.FirstName, ' ', P.LastName) AS 'Passenger',
RP.SeatNo, RP.Class, RP.Meal, L.*
FROM Leg L, Includes I, ReservationPassenger RP, Person P
WHERE I.FlightNo=L.FlightNo AND I.AirlineID=L.AirlineID
AND RP.ResrNo=111 AND RP.ResrNo=I.ResrNo AND P.Id=RP.Id;
```

Passenger	SeatNo	Class	Meal	AirlineID	FlightNo	LegNo	DepAirportID	ArrAirportID	ArrTime	DepTime	CurrArrTime	CurrDepTime
John Doe	33F	Economy	Chips	AA	111	1	LGA	LAX	2011-01-05 17:00:00	2011-01-05 11:00:00	2011-01-05 17:00:00	2011-01-05 11:00:00
John Doe	33F	Economy	Chips	AA	111	2	LAX	TYO	2011-01-06 07:30:00	2011-01-05 19:00:00	2011-01-06 07:30:00	2011-01-05 19:00:00

- A customer's current bid on a given reverse auction

```
SELECT NYOP
FROM Auctions
WHERE AccountNo = ?
```

Example:

```
SELECT NYOP
FROM Auctions
WHERE AccountNo = 102
```

NYOP
400.00

- The bid history for a given reverse auction

```
Select A.NYOP, R.ResrNo, ResrDate, R.BookingFee, R.TotalFare
R.AccountNo
```

From reservation R, Customer C, Auctions A
 Where C.AccountNo = R.AccountNo AND R.ResrNo=? AND
 A.AccountNo=C.AccountNo

Example:

Select A.NYOP, R.ResrNo, ResrDate, R.BookingFee, R.TotalFare
 From reservation R, Customer C, Auctions A
 Where C.AccountNo = R.AccountNo AND R.ResrNo=111 AND
 A.AccountNo=C.AccountNo

NYOP	ResrNo	ResrDate	BookingFee	TotalFare
400.00	111	2010-10-10 10:00:00	120.00	1200.00

- A history of all current and past reservations a customer has made

SELECT *
 FROM Reservation
 WHERE AccountNo = ?

Example:

SELECT *
 FROM Reservation
 WHERE AccountNo = 102

ResrNo	ResrDate	BookingFee	TotalFare	RepSSN	AccountNo
111	2010-10-10 10:00:00	120.00	1200.00	123456789	102
NULL	NULL	NULL	NULL	NULL	NULL

- Best-Seller list of flights

SELECT F.*, T.total
 FROM flight F,
 (SELECT I.AirlineID, I.FlightNo, COUNT(*) AS total
 FROM Includes I, Reservation R
 WHERE I.ResrNo=R.ResrNo
 GROUP BY I.AirlineID, I.FlightNo) AS T
 where F.AirlineID = T.AirlineId and F.FlightNo = T.flightNo
 group by F.AirlineID,F.FlightNo
 order by T.total DESC;

AirlineID	FlightNo	NoOfSeats	DaysOperating	MinLengthOfStay	MaxLengthOfStay	total
AA	111	100	1010100	1	2	2
AM	1337	33	1010100	1	2	1
JA	111	150	1111111	1	2	1

- Personalized flight suggestion list

Based on Customer and SQL query uses customer id

```

SELECT L.*, F.NoOfSeats, F.DaysOperating, F.MinLengthOfStay, F.MaxLengthOfStay
FROM Flight F, Leg L
WHERE F.FlightNo=L.FlightNo AND F.AirlineID=L.AirlineID AND
L.CurrArrTime>NOW() AND L.CurrDepTime>NOW()
AND F.AirlineID IN (
    Select Ic.AirlineID
    FROM Reservation R, Includes Ic
    WHERE R.AccountNo=(
        SELECT C.AccountNo FROM Customer C WHERE C.Id=?
    )
    AND R.ResrNo=Ic.ResrNo
    AND NOW() > (
        SELECT MAX(L.DepTime)
        FROM Leg L, Includes I
        WHERE I.ResrNo=R.ResrNo AND I.AirlineID=L.AirlineID AND
        I.FlightNo=L.FlightNo
    )
)

```

Example:

Note that the arrival and departure times values in WHERE clause are hardcoded to display flights

```

SELECT L.*, F.NoOfSeats, F.DaysOperating, F.MinLengthOfStay, F.MaxLengthOfStay
FROM Flight F, Leg L
WHERE F.FlightNo=L.FlightNo AND F.AirlineID=L.AirlineID AND
L.CurrArrTime>'2011-01-05 17:00:00' AND L.CurrDepTime>'2011-01-05 17:00:00'
AND F.AirlineID IN (
    Select Ic.AirlineID
    FROM Reservation R, Includes Ic
    WHERE R.AccountNo=(
        SELECT C.AccountNo FROM Customer C WHERE C.Id=1
    )
    AND R.ResrNo=Ic.ResrNo

```

```

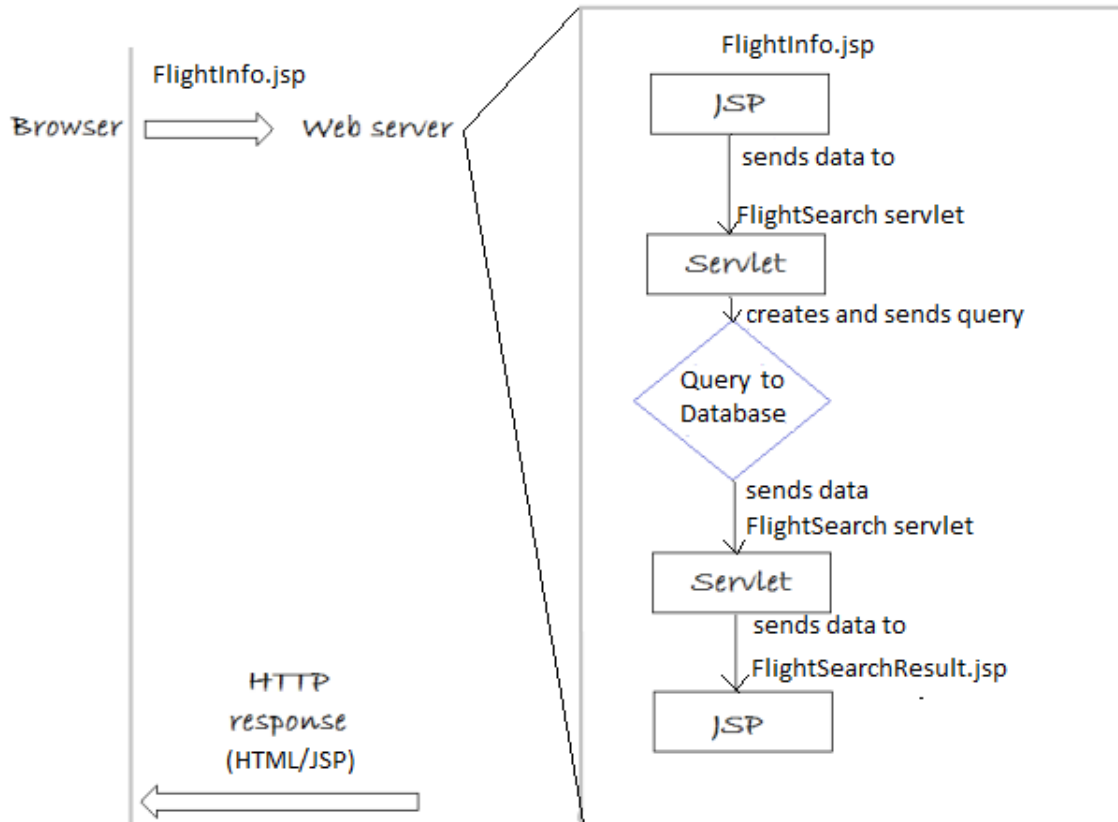
AND NOW() > (
    SELECT MAX(L.DepTime)
    FROM Leg L, Includes I
    WHERE I.ResrNo=R.ResrNo AND I.AirlineID=L.AirlineID AND
    I.FlightNo=L.FlightNo
)
);

```

AirlineID	FlightNo	LegNo	DepAirportID	ArrAirportID	ArrTime	DepTime	CurrArrTime	CurrDepTime	NoOfSeats	DaysOperating	MinLengthOfStay	MaxLengthOfStay
JA	111	1	SFO	BOS	2011-01-10 19:30:00	2011-01-10 14:00:00	2011-01-10 19:30:00	2011-01-10 14:00:00	150	11111111	1	2
JA	111	2	BOS	LON	2011-01-11 05:00:00	2011-01-10 22:30:00	2011-01-11 05:00:00	2011-01-10 22:30:00	150	11111111	1	2

Online User Interface Implementation

Architectural Diagram:



Note: This diagram can be applied to any of the requests.

Implementation Explanation:

1. We followed the MVC model to retrieve and display data from the database.
2. Requests are sent to servlets which then create and execute queries on the database.
3. When queries are finished executing, the data are returned back to the servlet.
4. The returned data in the servlet are sent to the appropriate JSP to be displayed.
5. The JSP is sent back to the browser to be displayed.