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**湖 州 师 范 学 院**

**本科生课程报告**

(Deadline: 2019-6-28)

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| --- | --- |
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| Major： | Computer Science and Technology |

**Airline Reservation System**

Database Design

# Requirements analysis

Book some tickets

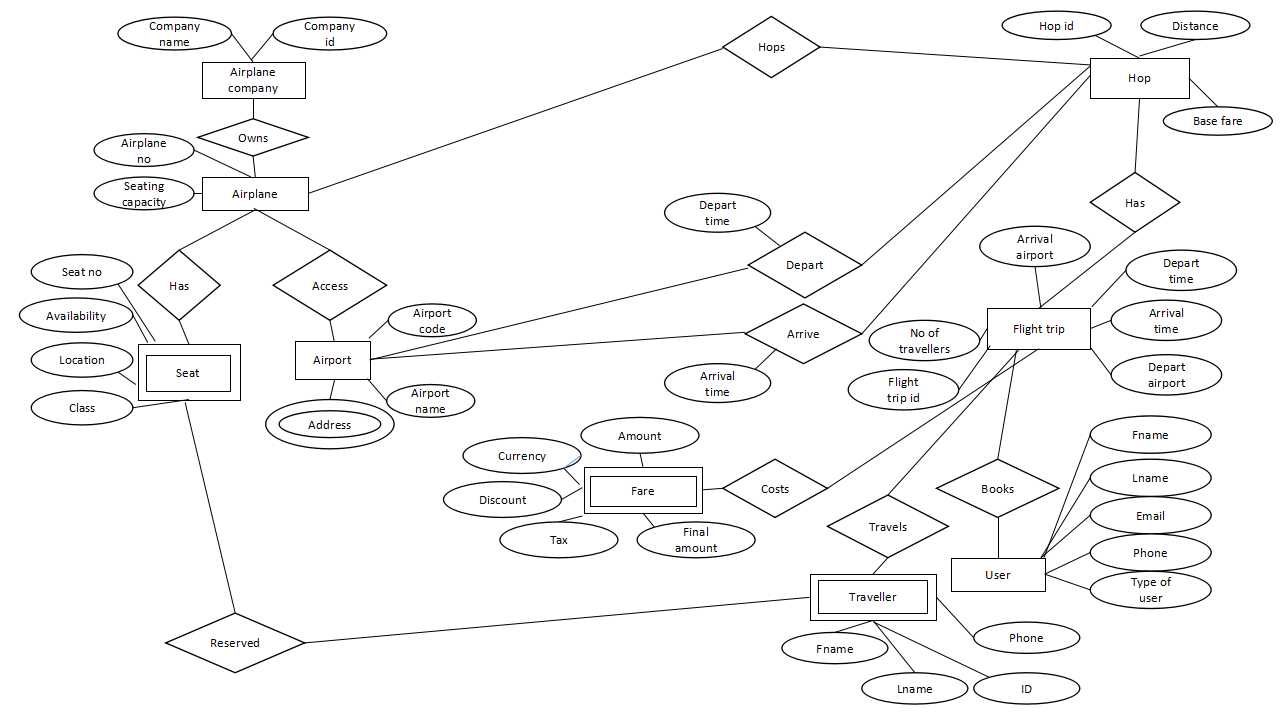
Search tickets according to the date , time and cities

Cancel the reservation

Output all tickets for the giving airline

Output tickets details for the giving person

# Conceptual Design



# Logical Design

One-to-Many Binary Relationships

AIRPLANE - hops - HOP

• AIRPORT - arrive - HOP

• AIRPORT - depart – HOP

• AIRLINE\_COMPANY - owns - AIRPLANE

• AIRPLANE - has - SEATS

• FLIGHT\_TRIP - travels – TRAVELLER

• USER - books - FLIGHT\_TRIP

Many-to-Many Binary Relationships

AIRPORT - access - AIRPLANE

• FLIGHT\_TRIP - has - HOP

One-to-One Binary Relationships

• SEAT-reserved-TRAVELLER

• FLIGHT\_TRIP - costs – FARE

# Physical Design

• A traveller can have multiple flight trips and there is no traveller without a flight trip i.e.

if there is no flight trip, there wont be any traveller for it

• Fare exists only if there is a flight trip i.e. if there is no flight trip, there wont be a cost for

it

• A user can book multiple flight trips

• A flight trip can have multiple hops and a particular hop can be used by multiple flight

trips

• An airline company can own many airplanes, but no airplanes can be without an airline

company.

• Address is a multi-value attribute

• Multiple airplanes can land on an airport and also multiple airports can handle multiple

airplanes

• An airplane-seat cannot exists without an airplane

• A single seat will be reserved for a single traveller

# Implementation/Code

CREATE TABLE AIRLINE\_COMPANY(

COMPANY\_ID VARCHAR(50) ,

COMPANY\_NAME VARCHAR(100) NOT NULL,

CONSTRAINT COMPANY\_PK PRIMARY KEY (COMPANY\_ID)

);

INSERT ALL

INTO AIRLINE\_COMPANY VALUES( 'AA' , 'Indian Airlines')

INTO AIRLINE\_COMPANY VALUES( 'BA' , 'Emirate Airways')

INTO AIRLINE\_COMPANY VALUES( 'EX' , 'British Airlines')

INTO AIRLINE\_COMPANY VALUES( 'JET' , 'Airasia Airways')

INTO AIRLINE\_COMPANY VALUES( 'SJ' , 'Malay Jet')

CREATE TABLE AIRPLANE(

AIRPLANE\_NO VARCHAR(25) ,

SEATING\_CAPACITY NUMBER NOT NULL,

COMPANY VARCHAR(50) NOT NULL,

CONSTRAINT AIRPLANE\_PK PRIMARY KEY (AIRPLANE\_NO),

CONSTRAINT PLANE\_COMPANY\_FK FOREIGN KEY (COMPANY)

REFERENCES AIRLINE\_COMPANY(COMPANY\_ID)

);

INSERT ALL

INTO AIRPLANE VALUES( 'AA751' , 40, 'AA' )

INTO AIRPLANE VALUES( 'AA851' , 60, 'AA' )

INTO AIRPLANE VALUES( 'EX100' , 40, 'EX' )

INTO AIRPLANE VALUES( 'JET785' , 60, 'JET' )

INTO AIRPLANE VALUES( 'BA747' , 40, 'BA' )

CREATE TABLE PLANE\_PORT\_ACCESS(

AIRPORT VARCHAR(25) NOT NULL,

AIRPLANE VARCHAR(25) NOT NULL,

CONSTRAINT ACCESS\_PK PRIMARY KEY (AIRPORT,AIRPLANE),

CONSTRAINT ACCESS\_PORT\_FK FOREIGN KEY (AIRPORT)

REFERENCES AIRPORT(AIRPORT\_CODE)

ON DELETE CASCADE,

CONSTRAINT ACCESS\_PLANE\_FK FOREIGN KEY (AIRPLANE)

REFERENCES AIRPLANE(AIRPLANE\_NO)

ON DELETE CASCADE

);

INSERT ALL

INTO PLANE\_PORT\_ACCESS VALUES( 'DFW','AA751' )

INTO PLANE\_PORT\_ACCESS VALUES( 'RDU','AA751' )

INTO PLANE\_PORT\_ACCESS VALUES( 'CLT','AA751' )

INTO PLANE\_PORT\_ACCESS VALUES( 'DFW','AA851' )

INTO PLANE\_PORT\_ACCESS VALUES( 'CLT','AA851' )

CREATE TABLE SEAT(

AIRPLANE VARCHAR(25) NOT NULL,

SEAT\_NO VARCHAR(5) NOT NULL,

AVAILABILITY VARCHAR(10) DEFAULT 'TRUE',

LOCATION VARCHAR(25) NOT NULL,

SEAT\_CLASS VARCHAR(25) NOT NULL,

CONSTRAINT SEAT\_PK PRIMARY KEY (AIRPLANE,SEAT\_NO),

CONSTRAINT SEAT\_PLANE\_FK FOREIGN KEY (AIRPLANE)

REFERENCES AIRPLANE(AIRPLANE\_NO)

ON DELETE CASCADE

);

INSERT ALL

INTO SEAT VALUES( 'AA751','A23','TRUE','WINDOW','ECONOMIC' )

INTO SEAT VALUES( 'AA751' ,'A24','TRUE','WINDOW','ECONOMIC' )

INTO SEAT VALUES( 'AA751' ,'A25','TRUE','WINDOW','ECONOMIC' )

INTO SEAT VALUES( 'AA851' ,'A23','TRUE','WINDOW','ECONOMIC' )

INTO SEAT VALUES( 'AA851' ,'A24','TRUE','WINDOW','ECONOMIC' )

CREATE TABLE END\_USER (

EMAIL VARCHAR(25) ,

FNAME VARCHAR(25) NOT NULL,

LNAME VARCHAR(25) NOT NULL,

PHONE NUMBER ,

TYPE\_OF\_USER VARCHAR(25) NOT NULL,

CONSTRAINT USER\_PK PRIMARY KEY (EMAIL)

);

INSERT ALL

INTO END\_USER VALUES

('diptoroy@gmail.com','dipto','roy',3582725902,'NORMAL' )

INTO END\_USER VALUES

('johndoe@gmail.com’,'john','doe',7925327259,'NORMAL' )

INTO END\_USER VALUES

('cristina54@gmail.com','cristina','54',6665223890,'NORMAL' )

INTO END\_USER VALUES

('alexford@gmail.com' ,'alex','ford',2354693300,'NORMAL' )

INTO END\_USER VALUES

( 'kamalraj@yahoo.com' ,'kamal','raj',0593605429,'AGENT' )

CREATE TABLE FLIGHT\_TRIP(

FLIGHT\_TRIP\_ID VARCHAR(15) ,

NO\_OF\_TRAVELLERS NUMBER NOT NULL,

ARRIVAL\_AIRPORT VARCHAR(25) NOT NULL,

ARRIVAL\_TIME DATE NOT NULL,

DEPART\_AIRPORT VARCHAR(25) NOT NULL,

DEPART\_TIME DATE NOT NULL,

USER\_EMAIL VARCHAR(25) NOT NULL,

CONSTRAINT FLIGHT\_TRIP\_PK PRIMARY KEY

(FLIGHT\_TRIP\_ID),

CONSTRAINT FLGHT\_TRIP\_USER\_FK FOREIGN KEY

(USER\_EMAIL) REFERENCES END\_USER(EMAIL)

ON DELETE SET NULL

);

INSERT ALL

INTO FLIGHT\_TRIP

VALUES('dipto17dec',1,'RDU',to\_date('2019/12/27:12:00:00AM',

'yyyy/mm/dd:hh:mi:ssam'),'DFW',to\_date('2019/12/26:12:00:00AM',

'yyyy/mm/dd:hh:mi:ssam'),'diptoroy@gmail.com' )

INTO FLIGHT\_TRIP

VALUES('john741',1,'RDU',to\_date('2019/12/27:12:00:00AM',

'yyyy/mm/dd:hh:mi:ssam'),'DAL',to\_date('2019/12/26:12:00:00AM',

'yyyy/mm/dd:hh:mi:ssam'),'johndoe@gmail.com' )

INTO FLIGHT\_TRIP

VALUES('cristina17dec',1,'RDU',to\_date('2019/12/27:12:00:00AM',

'yyyy/mm/dd:hh:mi:ssam') ,'DFW',to\_date('2019/12/26:12:00:00AM',

'yyyy/mm/dd:hh:mi:ssam'),'cristina54@gmail.com' )

INTO FLIGHT\_TRIP

VALUES('alex17dec',1,'RDU',to\_date('2019/12/27:12:00:00AM',

'yyyy/mm/dd:hh:mi:ssam'),'DFW',to\_date('2019/12/26:12:00:00AM',

'yyyy/mm/dd:hh:mi:ssam'),'alexford@gmail.com' )

INTO FLIGHT\_TRIP

VALUES('kamal17dec',1,'DFW',to\_date('2019/12/27:12:00:00AM',

'yyyy/mm/dd:hh:mi:ssam')'LAX',to\_date('2019/12/26:12:00:00AM',

'yyyy/mm/dd:hh:mi:ssam'),'kamalraj@yahoo.com' )

CREATE TABLE FARE(

FLIGHT\_TRIP\_ID VARCHAR(15) ,

FINAL\_AMOUNT DECIMAL(9,2) NOT NULL,

AMOUNT DECIMAL(9,2) NOT NULL,

CURRENCY VARCHAR(5) NOT NULL,

DISCOUNT DECIMAL(4,2) NOT NULL,

TAX DECIMAL(5,2) NOT NULL,

CONSTRAINT FARE\_PK PRIMARY KEY (FLIGHT\_TRIP\_ID),

CONSTRAINT FARE\_FLT\_TRIP\_FK FOREIGN KEY

(FLIGHT\_TRIP\_ID) REFERENCES FLIGHT\_TRIP(FLIGHT\_TRIP\_ID)

ON DELETE CASCADE

);

INSERT ALL

INTO FARE VALUES( 'dipto17dec',176,200,'$',10,10 )

INTO FARE VALUES( 'john741',176,200,'$',10,10 )

INTO FARE VALUES( 'cristina17dec',176,200,'$',10,10 )

INTO FARE VALUES( 'alex17dec',176,200,'$',10,10 )

INTO FARE VALUES( 'kamal17dec',176,200,'$',10,10 )

CREATE SEQUENCE TRAVELLER\_ID\_INCREMENT

MINVALUE 1

START WITH 1

INCREMENT BY 1

CACHE 10;

CREATE TABLE TRAVELLER(

ID NUMBER,

PHONE INTEGER,

FNAME VARCHAR(25) NOT NULL,

LNAME VARCHAR(25) NOT NULL,

CONSTRAINT TRAVELLER\_PK PRIMARY KEY (ID)

);

INSERT INTO TRAVELLER

VALUES(traveller\_id\_increment.nextVal,3582725902,'dipto','roy' );

INSERT INTO TRAVELLER

VALUES( traveller\_id\_increment.nextval,7925327259,'john','doe' );

INSERT INTO TRAVELLER

VALUES( traveller\_id\_increment.nextVal,6665223890,'cristina','54' );

INSERT INTO TRAVELLER

VALUES(traveller\_id\_increment.nextVal,2354693300,'alex','ford');

INSERT INTO TRAVELLER

VALUES( traveller\_id\_increment.nextVal,0593605429,'kamal','raj' );

CREATE TABLE TRAVELLER\_ITINERARY(

FLIGHT VARCHAR(15) NOT NULL,

ID VARCHAR(15),

SEAT\_NO VARCHAR(5),

AIRPLANE VARCHAR(25),

CONSTRAINT TRAVELLER\_PKK PRIMARY KEY

(FLIGHT,SEAT\_NO,AIRPLANE),

CONSTRAINT TRVLR\_FLT\_TRIP\_FK FOREIGN KEY (FLIGHT)

REFERENCES FLIGHT\_TRIP(FLIGHT\_TRIP\_ID)

ON DELETE CASCADE,

CONSTRAINT TRVLR\_SEAT\_FK FOREIGN

KEY(SEAT\_NO,AIRPLANE)

REFERENCES SEAT(SEAT\_NO,AIRPLANE)

);

INSERT ALL

INTO TRAVELLER\_ITINERARY VALUES( 'dipto17dec',2,'A23','AA751' )

INTO TRAVELLER\_ITINERARY VALUES( 'john741',6,'A24','AA751' )

INTO TRAVELLER\_ITINERARY VALUES( 'cristina17dec',3,'A25','AA751' )

INTO TRAVELLER\_ITINERARY VALUES( 'alex17dec',4,'A23','AA851' )

INTO TRAVELLER\_ITINERARY VALUES( 'kamal17dec',5,'A24','AA851' )

CREATE TABLE HOP(

HOP\_ID VARCHAR(15) ,

DISTANCE DECIMAL(7,2) NOT NULL,

BASE\_FARE DECIMAL(9,2) NOT NULL,

AIRPLANE VARCHAR(25) NOT NULL,

ARRIVAL\_AIRPORT VARCHAR(25) NOT NULL,

ARRIVAL\_TIME DATE NOT NULL,

DEPART\_AIRPORT VARCHAR(25) NOT NULL,

DEPART\_TIME DATE NOT NULL,

CONSTRAINT HOP\_PK PRIMARY KEY (HOP\_ID),

CONSTRAINT HOP\_APLNE\_FK FOREIGN KEY (AIRPLANE)

REFERENCES AIRPLANE(AIRPLANE\_NO),

CONSTRAINT HOP\_ARVL\_ARPRT\_FK

FOREIGN KEY(ARRIVAL\_AIRPORT)REFERENCES

AIRPORT(AIRPORT\_CODE),

CONSTRAINT HOP\_DRPT\_ARPRT\_FK FOREIGN

KEY(DEPART\_AIRPORT) REFERENCES

AIRPORT(AIRPORT\_CODE)

);

INSERT ALL

INTO HOP VALUES

('AX7458',600,200,'AA751','RDU',to\_date('2019/12/27:12:00:00AM','yyyy/mm/d

d:hh:mi:ssam'),'DFW',to\_date('2019/12/26:12:00:00AM',

'yyyy/mm/dd:hh:mi:ssam') )

INTO HOP VALUES

( 'AX7459',600,200,'AA851','RDU',to\_date('2019/12/27:12:00:00AM',

'yyyy/mm/dd:hh:mi:ssam'),'DAL',to\_date('2019/12/26:12:00:00AM',

'yyyy/mm/dd:hh:mi:ssam') )

INTO HOP VALUES

( 'AX7460',600,200,'AA751','RDU',to\_date('2019/12/27:12:00:00AM',

'yyyy/mm/dd:hh:mi:ssam'),'LAX',to\_date('2019/12/26:12:00:00AM',

'yyyy/mm/dd:hh:mi:ssam') )

INTO HOP VALUES

( 'AX7461',600,200,'AA751','RDU',to\_date('2019/12/27:12:00:00AM',

'yyyy/mm/dd:hh:mi:ssam'),'CLT',to\_date('2019/12/26:12:00:00AM',

'yyyy/mm/dd:hh:mi:ssam') )

INTO HOP VALUES

( 'AX7462',600,200,'AA751','DFW',to\_date('2019/12/27:12:00:00AM',

'yyyy/mm/dd:hh:mi:ssam'),'CLT',to\_date('2019/12/26:12:00:00AM',

'yyyy/mm/dd:hh:mi:ssam') )

CREATE TABLE HAS(

HOP VARCHAR(25) NOT NULL,

FLIGHT\_TRIP VARCHAR(15) NOT NULL,

CONSTRAINT HP\_HAS\_FT\_PK PRIMARY KEY

(HOP,FLIGHT\_TRIP),

CONSTRAINT HOP\_HAS\_FK FOREIGN KEY (HOP) REFERENCES

HOP(HOP\_ID),

CONSTRAINT FT\_HAS\_FK FOREIGN KEY(FLIGHT\_TRIP)

REFERENCES FLIGHT\_TRIP(FLIGHT\_TRIP\_ID)

ON DELETE CASCADE

);

INSERT ALL

INTO HAS VALUES( 'AX7458','dipto17dec' )

INTO HAS VALUES( 'AX7459','john741' )

INTO HAS VALUES( 'AX7458','cristina17dec' )

INTO HAS VALUES( 'AX7458','alex17dec' )

INTO HAS VALUES( 'AX7460','kamal17dec' )

the SQL queries using some of the basic operations.

• Simple SQL Select query:

o SELECT FNAME, LNAME FROM TRAVELLER WHERE ID IN (SELECT ID

FROM TRAVELLER\_ITINERARY WHERE FLIGHT='dipto17dec');

• Example of GROUP BY & aggregate function:

o SELECT USER\_EMAIL, COUNT (NO\_OF\_TRAVELLERS) FROM

FLIGHT\_TRIP WHERE USER\_EMAIL IN (SELECT EMAIL FROM

END\_USER WHERE TYPE\_OF\_USER ='NORMAL') GROUP BY

USER\_EMAIL;

• Example of JOIN:

o SELECT \* FROM FLIGHT\_TRIP INNER JOIN FARE ON

FLIGHT\_TRIP.FLIGHT\_TRIP\_ID=FARE.FLIGHT\_TRIP\_ID;

• Example of ALTER table:

o ALTER TABLE FARE ADD (CHECKING VARCHAR(25), CONSTRAINT FK

FOREIGN KEY(CHECKING) REFERENCES AIRPORT(AIRPORT\_CODE));

• Example of Dropping constraints and columns:

o ALTER TABLE FARE DROP CONSTRAINT FK;

o ALTER TABLE FARE DROP COLUMN CHECKING;

• Example of UNION operation:

o SELECT FNAME, LNAME FROM TRAVELLER WHERE ID IN(SELECT ID

FROM TRAVELLER\_ITINERARY WHERE FLIGHT='dipto17dec')

UNION

SELECT FNAME, LNAME FROM TRAVELLER WHERE ID IN(SELECT ID FROM

TRAVELLER\_ITINERARY WHERE FLIGHT='cristina17dec');

• Example of DROP table command:

o DROP table fare;