

5.12 a.

```
INSERT INTO SEAT_RESERVATION (FNO, LNO, DAT, SNO, CNA, CPH)
MODIFY LEG_INSTANCE (FLIGHT_NUMBER = FNO, LEG_NUMBER = LNO, DATE = DAT)
NUMBER_OF_AVAILABLE_SEATS = NUMBER_OF_AVAILABLE_SEATS + 1
```

b.

需要檢查 LEG_INSTANCE 中的 Number_of_available_seats, 可用坐席的數量, 是否能符合訂票坐席數量, 還有就是 SEAT_RESERVATION 中的座席號 Seat_Number 是否可用。

c.

訂票更新操作, INSERT INTO SEAT_RESERVATION 是 key, entity integrity, and referential integrity constraints, 檢查 LEG_INSTANCE 中的剩餘坐席操作不是這些約束。

d.

```
FLIGHT_LEG Flight_number > FLIGHT
LEG_INSTANCE Arrival_airport_code > FLIGHT_LEG
FARE Flight_number > FLIGHT
CAN_LAND Airplane_type_name > AIRPLANE_TYPE
CAN_LAND Airport_code > AIRPORT
LEG_INSTANCE Airplane_id > AIRPLANE
SEAT_RESERVATION Flight_number Leg_number > LEG_INSTANCE
```

5.17

OPTION 的 Serial_no 引用了 CAR 的 Serial_no。
SALE 的 Serial_no 引用了 CAR 中的 Serial_no。
SALE 的 Salesperson_id 引用了 SALESPERSON 的 Salesperson_id。

CAR

<u>Serial_no,</u>	Model,	Manufacturer,	Price
1	A	BMW	9999
2	S	KIA	8888

OPTION

<u>Serial_no,</u>	<u>Option_name,</u>	Price
8	motor	300
9	wheel	100

SALE

<u>Salesperson_id,</u>	<u>Serial_no,</u>	Date,	Sale_price
991	1	040882	9999
992	9	040985	200

SALESPERSON

<u>Salesperson_id,</u>	Name.	Phone
991	LUKE	0901
992	KIM	0909

```
INSERT INTO SALE VALUES('992','aka','040480','2345')
INSERT INTO SALESPERSON VALUES('NULL','alala','1234')
```

8.15 Show the result of each of the sample queries in Section 8.5 as it would apply to the database state in Figure 5.6.

QUERY1

RESULT

Fname	Lname	Address
John	Smith	731 Fondren, Houston, TX
Franklin	Wong	638 Voss, Houston, TX
Ramesh	Narayan	975 Fire Oak, Humble, TX
Joyce	English	5631 Rice, Huston, TX

QUERY2

Pnumber	Dnum	Lname	Address	Bdate
10	4	Wallace	291 Berry, Bellaire, TX	1941-06-20
30	4	Wallace	291 Berry, Bellaire, TX	1941-06-20

QUERY3

Lname	Fname
Smith	John
Narayang	Ramesh
English	Joyce
Wong	Franklin

QUERY4

Pno
1
2

Query5

Lname	Fname
Wong	Franklin
Smith	John

Query6

Lname	Fname
Zelaya	Alicia
Narayang	Ramesh
English	Joyce
Jabbar	Ahmad
Borg	James

Query7

Lname	Fname
Wong	Franklin

8.17

a

```
First departure leg = Flight_number ⋈ MIN Leg_number (FLIGHT_LEG)
Departure_airport = πFlight_number,Departure_airport_code (DEPARTURE * FLIGHT_LEG )
Last arrival leg = Flight_number ⋈ MAX Leg_number (FLIGHT_LEG)
Arrival_airport = πFlight_number, Arrival_airport_code (ARRIVAL * FLIGHT_LEG )
RESULT <- Departure_airport * Arrival_airport
```

b

```
Depart_Houston <- σ Departure_airport_code = 'IAH'(FLIGHT_LEG)
Arrival_LA <- σ Arrival_airport_code = 'LAX'(FLIGHT_LEG)
AllFromHoustonToLA <- Depart_Houston * Arrival_LA
RESULT <- π Flight_number, Weekdays(AllFromHoustonToLA * FLIGHT)
```

c

```
Depart_Houston <- σ Departure_airport_code = 'IAH'(FLIGHT_LEG)
Arrival_LA <- σ Arrival_airport_code = 'LAX'(FLIGHT_LEG)
AllFromHoustonToLA <- Depart_Houston * Arrival_LA
RESULT <-
```

```
    πFlight_number,Departure_airport_code,Scheduled_departure_time,
    Arrival_airport_code,Scheduled_arrival_time, Weekdays(AllFromHoustonToLA * FLIGHT)
```

d

```
RESULT <- σ Flight_number = 'co197' (FARE)
```

e

```
FareInfo <- σ Flight_number='CO197' AND Date='2009-10-09' (LEG_INSTANCE)
RESULT <- π Number_of_available_seats(FareInfo)
```

8.22

a.	P	Q	R	A	B	C
	10	a	5	10	b	6
	10	a	5	10	b	5
	25	a	6	25	c	3
b.	P	Q	R	A	B	C
	15	b	8	10	b	6
	15	b	8	10	b	5
c.	P	Q	R	A	B	C
	10	a	5	10	b	6
	10	a	5	10	b	5
	15	b	8	ω	ω	ω
	25	a	6	25	c	3
d.	P	Q	R	A	B	C
	15	b	8	10	b	6
	ω	ω	ω	25	c	3
	15	b	8	10	b	5
e.	P	Q	R			
	10	a	5			

	15	b	8			
	25	a	6			
	10	b	6			
	25	c	3			
	10	b	5			
f.	P	Q	R	A	B	C
	10	a	5	10	b	5

8.25 abcd

8.30 a, c, d, f, g

- a. $\{ t \mid R(t) \text{ AND } t.A=c \}$
 $\{ xyz \mid R(xyz) \text{ AND } x=c \}$
- c. $\{ t.A, t.B, t.C, q.D, q.E \mid R(t) \text{ AND } S(q) \text{ AND } t.C=q.C \},$
 $\{ xyzvw \mid R(xyz) \text{ AND } (\text{EXISTS } u) (S(uvw) \text{ AND } z=u) \}$
- d. $\{ t \mid R(t) \text{ OR } S(t) \}$
 $\{ xyz \mid R(xyz) \text{ OR } S(xyz) \}$
- f. $\{ t \mid R(t) \text{ AND NOT}(S(t)) \}$
 $\{ xyz \mid R(xyz) \text{ AND NOT}(S(xyz)) \}$
- g. $\{ t.A, t.B, t.C, q.D, q.E, q.F \mid R(t) \text{ AND } S(q) \}$
 $(xyzuvw \mid R(xyz) \text{ AND } S(uvw))$

9.4

SHIP

SHIP_TYPE

STATE_COUNTRY

SEA_OCEAN_LAKE

SHIP_MOVEMENT

PORT

VISIT

Sname Owner Type Pname

Type Tonnage Hull

Name Continent

Name

Ssname Date Time Longitude Latitude

State_country_name Pname Sea_ocean_lake_name

Vsname Vpname Startdate Enddate

```
graph LR; SHIP --- Sname; SHIP --- Owner; SHIP --- Type; SHIP --- Pname; SHIP_TYPE --- Type; SHIP_TYPE --- Tonnage; SHIP_TYPE --- Hull; STATE_COUNTRY --- Name; STATE_COUNTRY --- Continent; SEA_OCEAN_LAKE --- Name; SHIP_MOVEMENT --- Ssname; SHIP_MOVEMENT --- Date; SHIP_MOVEMENT --- Time; SHIP_MOVEMENT --- Longitude; SHIP_MOVEMENT --- Latitude; PORT --- State_country_name; PORT --- Pname; PORT --- Sea_ocean_lake_name; VISIT --- Vsname; VISIT --- Vpname; VISIT --- Startdate; VISIT --- Enddate; Sname --- Pname; Type --- Pname; Name --- Pname; Ssname --- Pname; Ssname --- Sea_ocean_lake_name; Vsname --- Pname; Vsname --- Sea_ocean_lake_name; Vsname --- Startdate; Vsname --- Enddate;
```