

1. Specify the following queries on the COMPANY relational database schema shown in Figure 5.5 using the relational operators discussed in this chapter.
 - A. List the names of all employees who have a dependent with the same first name as themselves.

$\sigma_{Dname=Dependent_name}(DEPENDENT * EMPLOYEE)$

- B. Retrieve the names of all employees that work on every project.

$\pi_{Fname}(EMPLOYEE * (WORKS_ON \div \rho_{(Pno)}(\pi_{Pnumber}(PROJECT))))$

- C. Retrieve the average salary of all female employees.

$\mathcal{F}_{AVERAGE\ Salary}(\sigma_{Sex='female'}(EMPLOYEE))$

- D. List the last names of all department managers who have no dependents.

$\pi_{Lname}((\pi_{Mgr_ssn}(DEPARTMENT) - \pi_{Mgr_ssn}(DEPARTMENT \bowtie_{Mgr_ssn=Essn} DEPENDENT)) \bowtie_{Ssn=Mgr_ssn} EMPLOYEE)$

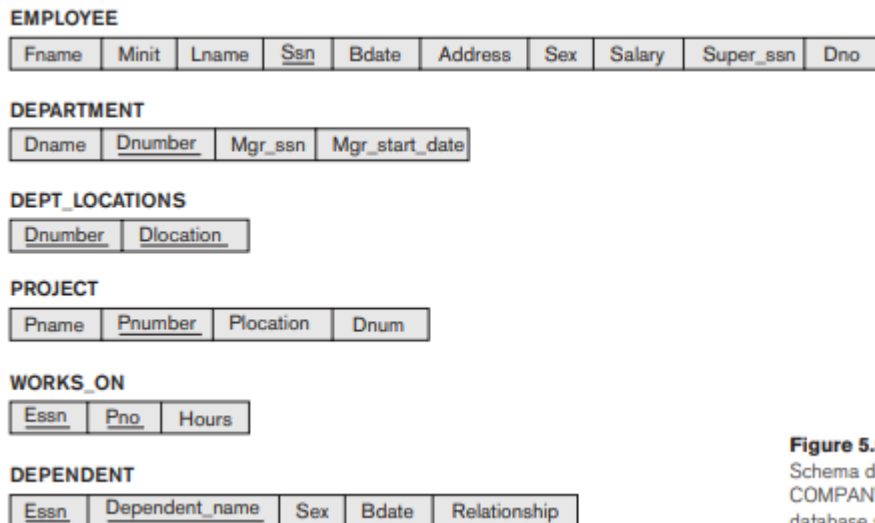


Figure 5.5
Schema diagram for the
COMPANY relational
database schema.

2. Specify query 1C using QBE format.

EMPLOYEE

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno
						female	P.AVG.		

3. Consider the AIRLINE relational database schema shown in Figure 5.8. Specify the following queries in relational algebra:

A. List all fare information for flight number 'co197'.

$\sigma_{\text{Fare_code}='co197'}(\text{FARE})$

B. List the flight numbers and weekdays of all flights or flight legs that depart from Houston Intercontinental Airport (airport code 'iah') and arrive in Los Angeles International Airport (airport code 'lax').

$\pi_{\text{Flight_number, Weekdays}}(\sigma_{\text{Departure_airport_code}='iah', \text{Arrival_airport_code}='lax'}(\text{FLIGHT} * \text{FLIGHT_LEG}))$

C. Retrieve the number of available seats for flight number 'co197' on '2009-10-09'.

$\pi_{\text{Number_of_available_seats}}(\sigma_{\text{Flight_number}='co197', \text{Date}='2009-10-09'}(\text{LEG_INSTANCE}))$

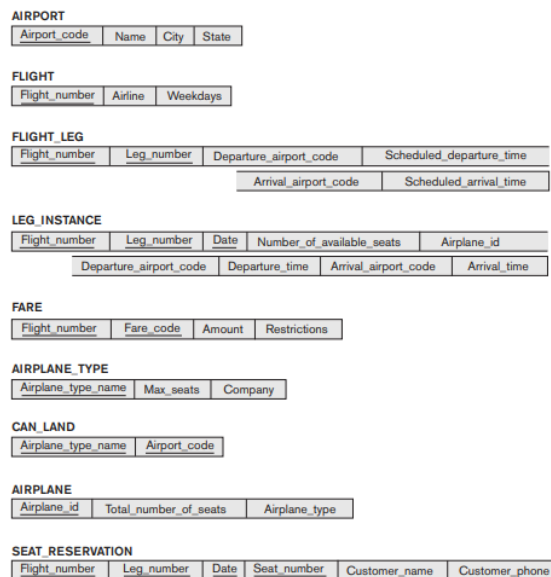


Figure 5.8
The AIRLINE relational database schema.

4. Specify query 3C using QBE format. (replaced 2C with 3C. expected as error)

LEG_INSTANCE

Flight_number	Leg_number	Date	Number_of_available_seats	Airplain_id	Departure_airport_code	Departure_time	Arrival_airport_code	Arrival_time
co197		2009-10-09	P.					

5. Specify the following queries in relational algebra on the database schema given in Exercise 5.14:

- A. List the Order# and Ship_date for all orders shipped from Warehouse #W2.

$$\pi_{\text{Order\#, Ship_date}}(\sigma_{\text{Warehouse\#='W2'}}(\text{SHIPMENT}))$$

- B. Produce a listing Cname, No_of_orders, Avg_order_amt, where the middle column is the total number of orders by the customer and the last column is the average order amount for that customer.

$$\rho_{\text{Cname, No_of_orders, Avg_order_amt}}(\text{Cust\#} \mathcal{F} \text{COUNT Order\#, AVERAGE Ord_amt}(\text{CUSTOMER*ORDER}))$$

- C. List the Order# for orders that were shipped from all warehouses that the company has in New York.

$$\pi_{\text{Order\#}}(\sigma_{\text{City='New York'}}(\text{ORDER*SHIPMENT*WAREHOUSE}))$$

CUSTOMER(Cust#, Cname, City)
 ORDER(Order#, Odate, Cust#, Ord_amt)
 ORDER_ITEM(Order#, Item#, Qty)
 ITEM(Item#, Unit_price)
 SHIPMENT(Order#, Warehouse#, Ship_date)
 WAREHOUSE(Warehouse#, City)

6. Specify query 5B using QBE format.

CUSTOMER

Cust#	Cname	City
_CUST	P.	

ORDER

Order#	Odate	Cust#	Ord_amt
P.CNT.H("No_of_orders").	P.AVG.ALL.H("Avg_order_amt").	_CUST.G.	