Chapter 3

The Relational Algebra (Exercises)

Department: Computer
Course: DBMS
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Question -

lives (person-name,street,city)
works(person-name, company-name,salary)
locatedin(company-name,city)
manages(person-name,manager-name)

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1. Find all tuples in works of all persons who work for the CityBank company

Question -

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works(person-name, company-name,salary)
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1. Find all tuples in works of all persons who work for the CityBank company

$$\sigma_{(\text{cname}=\text{'City Bank'})}(\text{works})$$

Question -

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1. Find all tuples in works of all persons who work for the CityBank company

$$\sigma_{(\text{cname}=\text{'City Bank'})}(\text{works})$$

2. Find the name of persons working at City Bank who earn more than $50,000.

Question -

lives (person-name,street,city)
works(person-name, company-name,salary)
locatedin(company-name,city)
manages(person-name,manager-name)

1. Find all tuples in works of all persons who work for the CityBank company

$$\sigma_{(cname='City\ Bank')}(works)$$

2. Find the name of persons working at City Bank who earn more than $50,000.

$$\pi_{pname}(\sigma_{(cname='City\ Bank') \wedge (salary>50000)}(works))$$

Question -

lives (person-name,street,city)
works(person-name, company-name,salary)
locatedin(company-name,city)
manages(person-name,manager-name)

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$$\sigma_{(cname='City\ Bank')}(works)$$

2. Find the name of persons working at City Bank who earn more than $50,000.

$$\pi_{pname}(\sigma_{(cname='City\ Bank') \wedge (salary>50000)}(works))$$

3. Find the name and city of all persons who work for City Bank and earn more than 50,000.

Question -

lives (person-name,street,city)
works(person-name, company-name,salary)
locatedin(company-name,city)
manages(person-name,manager-name)

1. Find all tuples in works of all persons who work for the CityBank company

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2. Find the name of persons working at City Bank who earn more than $50,000.

$$\pi_{pname}(\sigma_{(cname='City\ Bank') \wedge (salary>50000)}(works))$$

3. Find the name and city of all persons who work for City Bank and earn more than 50,000.

$$\pi_{lives.pname,lives.city}(\sigma_{((cname='City\ Bank') \wedge (salary>50000) \wedge (lives.pname=works.pname)))}(lives \times works)$$

OR

$$\pi_{lives.pname,lives.city}(\sigma_{((cname='City\ Bank') \wedge (salary>50000))})(lives \bowtie_{lives.pname=works.pname} works)$$

Question -

lives (person-name,street,city)
works(person-name, company-name,salary)
locatedin(company-name,city)
manages(person-name,manager-name)

4. Find names of all persons who live in the same city as the company they work for.

Question -

lives (person-name,street,city)
works(person-name, company-name,salary)
locatedin(company-name,city)
manages(person-name,manager-name)

4. Find names of all persons who live in the same city as the company they work for.

$$\pi_{lives.pname}\left(\sigma_{((locatedin.cname=works.cname)\wedge(located-in.city=lives.city)\wedge(lives.pname=works.pname))}\left(works \times lives \times locatedin\right)\right)$$

OR

$$\pi_{lives.pname}\left(\sigma_{(located-in.city=lives.city)}\left(\left(works \bowtie_{(lives.pname=works.pname)} lives\right) \bowtie_{works.cname=locatedin.cname} locatedin\right)\right)$$

Question -

lives (person-name,street,city)
works(person-name, company-name,salary)
locatedin(company-name,city)
manages(person-name,manager-name)

5. Find names of all persons who do not work for City Bank.

Question -

lives (person-name,street,city)
works(person-name, company-name,salary)
locatedin(company-name,city)
manages(person-name,manager-name)

5. Find names of all persons who do not work for City Bank.

$$(\pi_{pname}(works)) - (\pi_{pname}(\sigma_{cname='City\ Bank'}(works)))$$

Question -

lives (person-name,street,city)
works(person-name, company-name,salary)
locatedin(company-name,city)
manages(person-name,manager-name)

5. Find names of all persons who do not work for City Bank.

$$(\pi_{pname}(works)) - (\pi_{pname}(\sigma_{cname='City\ Bank'}(works)))$$

6. Find the name of all persons who work for City Bank and live in DC.

Question -

lives (person-name,street,city)
works(person-name, company-name,salary)
locatedin(company-name,city)
manages(person-name,manager-name)

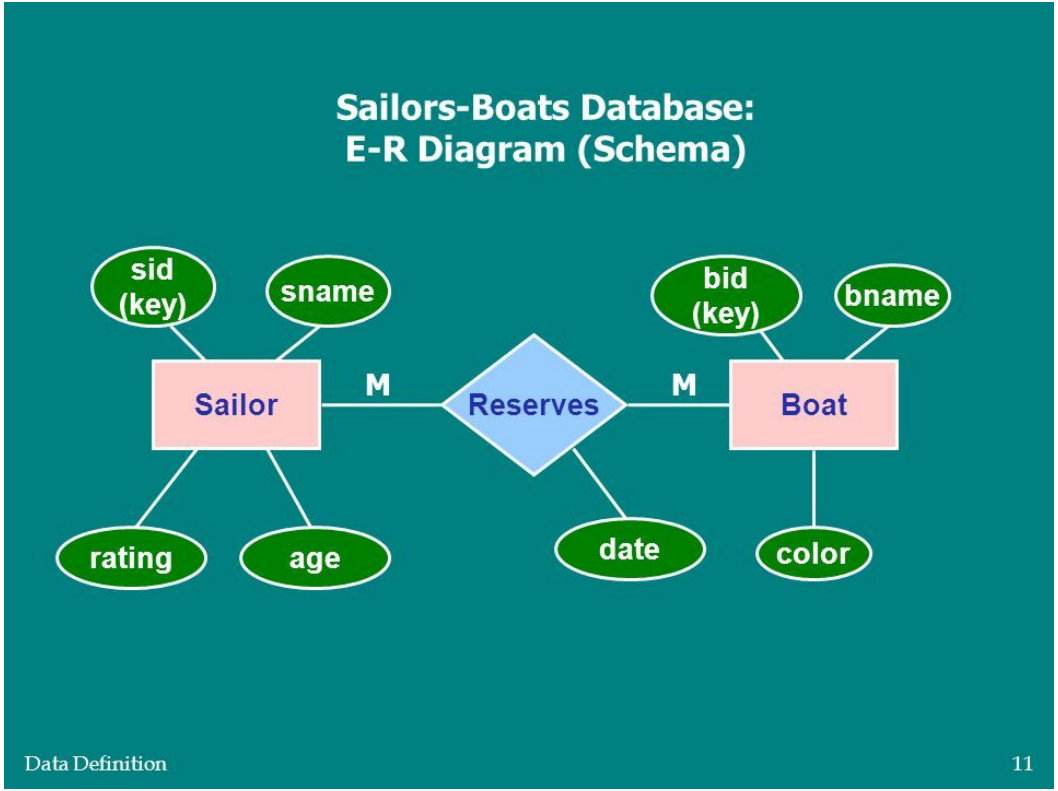
5. Find names of all persons who do not work for City Bank.

$$(\pi_{pname}(works)) - (\pi_{pname}(\sigma_{cname='City\ Bank'}(works)))$$

6. Find the name of all persons who work for City Bank and live in DC.

$$\pi_{lives.pname}(\sigma_{((cname='City\ Bank') \wedge (lives.city='DC') \wedge (lives.pname=works.pname))})(lives \times works)$$

Question - Convert Following ER diagram into Relational Model



Question

Consider the Sailors-Boats-Reserves DB described below and Write each of the following queries in Relational Algebra.

Sailor (sid, sname, rating, age)
Boat (bid, bname, color)
Reserves (sid, bid, date)

Question

Consider the Sailors-Boats-Reserves DB described below and Write each of the following queries in Relational Algebra.

s(sid, sname, rating, age)
b(bid, bname, color)
r(sid, bid, date)

(1) Find the colors of boats reserved by Albert.

Question

Consider the Sailors-Boats-Reserves DB described below and Write each of the following queries in Relational Algebra.

s(sid, sname, rating, age)
b(bid, bname, color)
r(sid, bid, date)

(1) Find the colors of boats reserved by Albert.

$$\pi_{color}\left[\left(\sigma_{sname=`Albert'}(s)\right) \bowtie r \bowtie b\right]$$

Question

Consider the Sailors-Boats-Reserves DB described below and Write each of the following queries in Relational Algebra.

s(sid, sname, rating, age)
b(bid, bname, color)
r(sid, bid, date)

(2) Find all sailor id's of sailors who have a rating of at least 8 or reserved boat 103

Question

Consider the Sailors-Boats-Reserves DB described below and Write each of the following queries in Relational Algebra.

s(sid, sname, rating, age)
b(bid, bname, color)
r(sid, bid, date)

(2) Find all sailor id's of sailors who have a rating of at least 8 or reserved boat 103

$$\pi_{sid}\left(\sigma_{rating \geq 8}(S)\right) \cup \pi_{sid}[\sigma_{bid=103}(r)]$$

Question

Consider the Sailors-Boats-Reserves DB described below and Write each of the following queries in Relational Algebra.

s(sid, sname, rating, age)
b(bid, bname, color)
r(sid, bid, date)

(3) Find the names of sailors who have not reserved a red boat.

Question

Consider the Sailors-Boats-Reserves DB described below and Write each of the following queries in Relational Algebra.

s(sid, sname, rating, age)
b(bid, bname, color)
r(sid, bid, date)

(3) Find the names of sailors who have not reserved a red boat.

$$\pi_{sname}([\pi_{sid}(s) - \pi_{sid}(\sigma_{color=`red'}(b) \bowtie r)] \bowtie s)$$

Question

Consider the Sailors-Boats-Reserves DB described below and Write each of the following queries in Relational Algebra.

s(sid, sname, rating, age)
b(bid, bname, color)
r(sid, bid, date)

(4) Find the names of sailors who have reserved boat 109

Question

Consider the Sailors-Boats-Reserves DB described below and Write each of the following queries in Relational Algebra.

s(sid, sname, rating, age)
b(bid, bname, color)
r(sid, bid, date)

(4) Find the names of sailors who have reserved boat 109

$$\Pi_{sname}(\sigma_{bid=109}(s \bowtie r))$$

Question

Consider the Sailors-Boats-Reserves DB described below and Write each of the following queries in Relational Algebra.

s(sid, sname, rating, age)
b(bid, bname, color)
r(sid, bid, date)

(5) Find the color of the boats reserved by 'Harry'

Question

Consider the Sailors-Boats-Reserves DB described below and Write each of the following queries in Relational Algebra.

s(sid, sname, rating, age)
b(bid, bname, color)
r(sid, bid, date)

(5) Find the color of the boats reserved by 'Harry'

$$\Pi_{color}(((\sigma_{sname='Harry'}(s)) \bowtie r) \bowtie b)$$

OR

$$\Pi_{color}(\sigma_{sname='Harry'}(s \bowtie r \bowtie b))$$

Question

Consider the Sailors-Boats-Reserves DB described below and Write each of the following queries in Relational Algebra.

s(sid, sname, rating, age)
b(bid, bname, color)
r(sid, bid, date)

(6) Find the names of sailors who have reserved all boats.

Question

Consider the Sailors-Boats-Reserves DB described below and Write each of the following queries in Relational Algebra.

s(sid, sname, rating, age)
b(bid, bname, color)
r(sid, bid, date)

(6) Find the names of sailors who have reserved all boats.

$$\pi_{sname}\left([\pi_{sid,bid}(r) \div \pi_{bid}(b)] \bowtie s\right)$$

OR

$$\Pi_{sname,\ bid}(s \bowtie r) \div \Pi_{bid}(b)$$

Question

Consider the Sailors-Boats-Reserves DB described below and Write each of the following queries in Relational Algebra.

s(sid, sname, rating, age)
b(bid, bname, color)
r(sid, bid, date)

(7) Find the names of the sailors who have reserved a red and a green boat

Question

Consider the Sailors-Boats-Reserves DB described below and Write each of the following queries in Relational Algebra.

s(sid, sname, rating, age)
b(bid, bname, color)
r(sid, bid, date)

(7) Find the names of the sailors who have reserved a red and a green boat

$$\Pi_{sname}(\sigma_{color='red'}(s \bowtie r \bowtie b)) \cap \Pi_{sname}(\sigma_{color='green'}(s \bowtie r \bowtie b))$$

Question

Consider the Sailors-Boats-Reserves DB described below and Write each of the following queries in Relational Algebra.

s(sid, sname, rating, age)
b(bid, bname, color)
r(sid, bid, date)

(8) Find the names of the sailors who have reserved a red or green boat

Question

Consider the Sailors-Boats-Reserves DB described below and Write each of the following queries in Relational Algebra.

s(sid, sname, rating, age)
b(bid, bname, color)
r(sid, bid, date)

(8) Find the names of the sailors who have reserved a red or green boat

$$\Pi_{sname}(\sigma_{color='red'}(s \bowtie r \bowtie b))$$

$$\cup$$

$$\Pi_{sname}(\sigma_{color='green'}(s \bowtie r \bowtie b))$$

Question

Consider the Sailors-Boats-Reserves DB described below and Write each of the following queries in Relational Algebra.

s(sid, sname, rating, age)
b(bid, bname, color)
r(sid, bid, date)

(9) Find the names of the sailors who have not reserved a boat

Question

Consider the Sailors-Boats-Reserves DB described below and Write each of the following queries in Relational Algebra.

s(sid, sname, rating, age)
b(bid, bname, color)
r(sid, bid, date)

(9) Find the names of the sailors who have not reserved a boat

$$\Pi_{sid,\ sname}(s) - \Pi_{sid,\ sname}(s \bowtie r)$$