COMP231 Tutorial 3

Structured Query Language

Exercise 1

❖ Given the following tables:

employee (<u>person_name</u>, street, city)

works (<u>person_name</u>, <u>company_name</u>, salary)

company (<u>company_name</u>, city)

manages (<u>person_name</u>, <u>manager_name</u>)

❖ Answer the questions by using

RA   - Relational Algebra

SQL - Structured Query Language

RA SQL

❖ Given the following tables:

employee (<u>person_name</u>, street, city)

works (<u>person_name</u>, <u>company_name</u>, salary)

company (<u>company_name</u>, city)

manages (<u>person_name</u>, <u>manager_name</u>)

❖ Find the name of employees who earn more than $10,000 and live in Hong Kong.

$$\pi_{person\_name}(\sigma_{salary>10,000 \wedge city="Hong Kong"}(employee \bowtie_{person\_name} works))$$

❖ Alternative Solution:

$$\pi_{person\_name}(\sigma_{salary>10000}(works)) \cap \pi_{person\_name}(\sigma_{city="Hong Kong"}(employee))$$

employee (person_name, street, city)
works (person_name, company_name, alary)
company (company_name, city)
manages (person_name, manager_name)

❖ Find the name of employees who earn more than $10,000 and live in Hong Kong.

select *w.person_name*
from   *works* **as** *w*
where *w.salary > 10000* **and** *w.person_name* **in**
         (**select** *e.person_name*
          from   *employee* **as** *e*
          where *e.city = "Hong Kong"*)

❖ Alternative solutions

select *w.person_name*
from   *works* **as** *w, employee* **as** *e*
where *w.salary > 10000* **and** *e.city = "Hong Kong"*
         and *w.person_name = e.person_name*

RA SQL

❖ Given the following tables:

employee (<u>person_name</u>, street, city)

works (<u>person_name</u>, <u>company_name</u>, salary)

company (<u>company_name</u>, city)

manages (<u>person_name</u>, <u>manager_name</u>)

❖ Find the name of the employees who are not managers.

$$\pi_{person\_name}(employee) - \pi_{manager\_name}(manages)$$

employee (person_name, street, city)
works (person_name, company_name, alary)
company (company_name, city)
manages (person_name, manager_name)

❖ Find the name of the employees who are not managers.

(**select** *person_name*

 from *employee*)

 except

(**select** *manager_name*

 from *manages*)

❖ Alternative solutions

employee (person_name, street, city)
works (person_name, company_name, alary)
company (company_name, city)
manages (person_name, manager_name)

select *person_name*
from *employee*
where not exists
 (**select** *
  from *manages*
  where *employee.person_name = manages.manager_name*)

select *person_name*
from *employee*
where *person_name* **not in**
 (**select** *manager_name*
  from *manages*)

RA SQL

❖ Given the following tables:

employee (<u>person_name</u>, street, city)

works (<u>person_name</u>, <u>company_name</u>, salary)

company (<u>company_name</u>, city)

manages (<u>person_name</u>, <u>manager_name</u>)

❖ Find the names of all persons who work for "First Bank Corporation" and live in the city where the company is located.

$$\pi_{employee.person\_name}(\sigma_{employee.city=company.city}$$
$$(employee \bowtie_{person\_name} works \bowtie_{company\_name} (\sigma_{company\_name="First Bank Corporation"} company)))$$

employee (person_name, street, city)
works (person_name, company_name, alary)
company (company_name, city)
manages (person_name, manager_name)

❖ Find the names of all persons who work for "First Bank Corporation" and live in the city where the company is located.

select *E.person_name*

from *employee* **as** *E, works* **as** *W, company* **as** *C*

where *E.person_name = W.person_name*

    and *W.company_name = C.company_name*

    and *C.company_name = "First Bank Corporation"*

    and *E.city = C.city*

RA SQL

❖ Given the following tables:

employee (<u>person_name</u>, street, city)

works (<u>person_name</u>, <u>company_name</u>, salary)

company (<u>company_name</u>, city)

manages (<u>person_naame</u>, <u>manager_name</u>)

❖ Find the names of the persons who work in all companies in Boston.

$$(\pi_{person\_name, \ company\_name}(works)) \ / \ (\pi_{company\_name}(\sigma_{city=\text{"Boston"}}(company)))$$

employee (person_name, street, city)
works (person_name, company_name, alary)
company (company_name, city)
manages (person_name, manager_name)

❖ Find the names of the employees who work in all companies in Boston.

select *w.person_name*
from *works* **as** *w*
where not exists (
    (**select** *company_name*
    from *company*
    where *city* = "Boston")
    except
    (**select** *company_name*
    from *works* **as** *w1*
    where *w1.person_name* = *w.person_name*))

X: all companies in Boston

Y: all companies that *w* works for

$X - Y = \phi \Leftrightarrow X \subseteq Y$

Exercise 2

Further Exercise on *SQL - Structured Query Language*

❖ Given the following tables:

employee (person_name, street, city)

works (person_name, company_name, salary)

company (company_name, city)

manages (person_name, manager_name)

❖ Find all cities where employees live or where companies are located

(**select** *city*

 from *employee*)

 union

(**select** *city*

 from *company*)

---

employee (<u>person_name</u>, street, city)
works (<u>person_name</u>, <u>company_name</u>, salary)
company (<u>company_name</u>, city)
manages (<u>person_naame</u>, <u>manager_name</u>)

❖ Find the names, city of employees who work (in at least a company)

select   *e.person_name, e.city*

from   *employee* **as** *e*

where exists

(**select**   *

from   *works* **as** *w*

where *w.person_name = e.person_name*)

❖ Alternative solution

select   *e.person_name, e.city*

from   *employee* **as** *e, works* **as** *w*

where   *w.person_name = e.person_name*

employee (person_name, street, city)
works (person_name, company_name, salary)
company (company_name, city)
manages (person_naame, manager_name)

❖ Display the names of all employees who work (in at least a company) and the city of the company in ascending order of names

select *w.person_name, c.city*

from *works* **as** *w, company* **as** *c*

where *c.company_name = w.company_name*

order by *w.person_name* **asc**

employee (person_name, street, city)
works (person_name, company_name, salary)
company (company_name, city)
manages (person_naame, manager_name)

❖ Find the names, cities of employees who work for exactly ONE
   company

select *e.person_name, e.city*

from *employee* **as** *e*

where unique

   (**select** *

    from *works* **as** *w,*

    where *w.person_name = e.person_name*)

---

employee (person_name, street, city)
works (person_name, company_name, salary)
company (company_name, city)
manages (person_naame, manager_name)

❖ Find the names of all employees who earn more than SOME employee of Small Bank Corporation.

select *w1.person_name*
from   *works* **as** *w1*
where *w1.salary* > **some**
  (**select**   *w2.salary*
   from   *works* **as** *w2*
   where *w2.company_name* = "Small Bank Corporation")

❖ Alternative solution

employee (person_name, street, city)
works (person_name, company_name, salary)
company (company_name, city)
manages (person_naame, manager_name)

select *w1.person_name*
from   *works* **as** *w1*
where exists
  (**select**   *
   from   *works* **as** *w2*
   where *w2.company_name* = "Small Bank Corporation" **and**
       w1.salary > w2.salary)

❖ Find the company located in Hong Kong that has the largest number of employees

select *temp.company_name*

from **(select** *w.company_name*, **count(distinct** *w.person_name*) **as** *cnt*

    from *works* **as** *w, company* **as** *c*

    where *w.company_name = c.company_name*

        and *c.city* = "Hong Kong"

    group by *w.company_name*) **as** *temp*

where *temp.cnt* **in** **(select max** (*cnt*)

        from *temp*)

employee (person_name, street, city)
works (person_name, company_name, salary)
company (company_name, city)
manages (person_naame, manager_name)

employee (person_name, street, city)
works (person_name, company_name, salary)
company (company_name, city)
manages (person_naame, manager_name)

❖ Find all companies located in Hong Kong and have total payroll less than 100,000

select *company.company_name*
from *works, company*
where

      works.company_name = company.company_name

      and *company.city = "Hong Kong"*
group by *company.company_name*
having *sum(works.salary) < 100,000*