Relational Algebra Expression and SQL

3.1 Write the following queries in SQL, using the university schema. (We suggest you actually run these queries on a database, using the sample data that we provide on the Web site of the book, db-book.com. Instructions for setting up a database, and loading sample data, are provided on the above Web site.)

a. Find the titles of courses in the Comp. Sci. department that have 3 credits.

Relational Algebra Expression:

$$\prod \text{title}\ (\sigma\ \text{dept\_name} =' \text{Comp. Sci.}' \wedge credits = 3(Course))$$

SQL:

select *title*

from *course*

where *dept_name* = 'Comp.Sci.' **and** *credits* = 3;

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b. Find the IDs of all students who were taught by an instructor named Einstein; make sure there are no duplicates in the result.

See the answer here http://codex.cs.yale.edu/avi/db-book/db6/practice-exer-dir/3s.pdf

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c. Find the highest salary of any instructor.

Relational Algebra Expression:

$$\mathcal{G}\ \textbf{max}(\text{salary})(\text{instructor})$$

SQL:

select **max** (salary)

from *instructor;*

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d. Find all instructors earning the highest salary (there may be more than one with the same salary).

Relational Algebra Expression:

$$\sigma\ \text{salary} = (\mathcal{G}\ \textbf{max}(\text{salary})(\text{instructor}))(\text{instructor})$$

SQL:

```
select  *
from    instructor
where   salary = (select  max(salary)
                  from    instructor);
```

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employee (person name, street, city)

works (person name, company name, salary)

company (company name, city)

2.7 Consider the relational database of Figure 2.14. Give an expression in the relational algebra to expresseach of the following queries:

a. Find the names of all employees who live in city "Miami".

Relational Algebra Expression:

$$\prod \text{person\_name}(\sigma\ \text{city} = \text{'Miami'}(\text{employee}))$$

SQL:

```
select  person_name
from    employee
where   city = 'Miami';
```

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b. Find the names of all employees whose salary is greater than $100,000.

Relational Algebra Expression:

$$\prod\ \text{person\_name}(\sigma\ \text{salary} > 100{,}000(\text{works}))$$

SQL:

```
select  person_name
from    works
where   salary > 100,000;
```
