Database Management Systems (COP 5725)

Spring 2017

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Homework 2

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Pledge (Must be signed according to UF Honor Code)

On my honor, I have neither given nor received unauthorized aid in doing this assignment.

______________________________________________
Signature

For scoring use only:

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Maximum</th>
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<tbody>
<tr>
<td>Exercise 1</td>
<td>25</td>
<td></td>
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<td>Exercise 2</td>
<td>25</td>
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<td>Exercise 3</td>
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Exercise 1 (Knowledge Questions) [25 points]

Answer the following questions:

1. Briefly describe the terms relation, key, and primary key. [5 points]
2. What is a 1:m relationship set R between two entity sets E1 and E2? (5 points)
3. Describe the definition of relational algebra and the basic operations in relational algebra with their name and their correct symbolic notation. [5 points].
4. What is the difference between a set and a list? Use relation and tuple as simple examples. [5 points]
5. Express the Quotient (Division) operator \( \div \) in terms of other basic operations. [5 points]

Exercise 2 (Relational Algebra) [25 Points]

Assume the following database schema for this homework:

Suppliers\(\text{sid}: \) integer, sname: string, address: string\)

Parts\(\text{pid}: \) integer, pname: string, color: string\)

Catalog\(\text{sid}: \) integer, \(\text{pid}: \) integer, cost: real\)

Give an expression in the relational algebra to express each of the following queries.

(a) Find the names of suppliers who supply some blue part. [5 points]

(b) Find the sids of suppliers who supply some red part or are at 102 Pine Street. [5 points]

(c) Find the sids of suppliers who supply every blue part. [5 points]

(d) Find pairs of sids such that the supplier with the first sid charges more for some part than the supplier with the second sid. [5 points]

(e) Find the pids of the least expensive parts supplied by suppliers named Ramebit Asrim. [5 points]
Exercise 3 (Relational Algebra) [50 points]

Consider the following database schema:

EMPLOYEE (emp_name: string, address_street: string, address_city: string, phone_no: integer)

DEPARTMENT (dept_name: string, mgr_name: string, mgr_start_date: date)

WORKS_ON (emp_name: string, industry_name: string, salary: integer)

INDUSTRY (industry_name: string, location_city: string)

MANAGES (emp_name: string, mgr_name: string)

Express the following colloquial queries in Relational Algebra:

1. Find the names of all employees who work for ‘Verizon Wireless’. [7 points]
2. Find the phone number of employee with the highest salary. [7 points]
3. Find the names and cities of residence of all employees who work for ‘IBM’ and earn more than $80,000 per year. [7 points]
4. Find the names of all employees who live in the same city and on the same street as their managers. [9 points]
5. Find the department name that every employee working in it lives in the ‘Genius’ street. [7 points].
6. Find the manager name with the earliest start time at department CISE. [7 points]
7. Find the phone number of all employees who are not managers. [6 points]