

UNCA CSCI 343
Exam 1 Spring 2014
3 March, 2014

This is a closed book and closed notes exam. It is to be turned in by 11:15 AM. Calculators, PDA's, cell phones, and any other electronic or communication devices may not be used during this exam.

If you want partial credit for imperfect answers, explain the reason for your answer!

Name: _____

The following description is for the first four problems

Suppose you want to represent the people involved in field trips for an elementary school. A field trip is composed of the following people: a single teacher, some students, and possibly chaperons. The students and chaperons are assigned to groups. Every group has students and at most one chaperon. (Some groups have no chaperon.) To summarize:

- 1) A field trip consists of a teacher and several groups
- 2) Each group consists of several students and at most one chaperon.
- 3) Every person is identified by a simple text string.

In the first two problems, create sample structures to represent a single field trip consisting of a teacher "Ms English" with a single group consisting of a chaperon "Mr Condor" and students "Arie" and "Ferd".

Problem 1 (5 points) XML

Write a well-formed XML structure to represent the sample field trip.

Problem 2 (5 points) JSON

Write a legal JSON object to represent the sample field trip.

Problem 3 (12 points) XML DTD

Write an XML DTD specification appropriate for representing field trips. Your answer should be appropriate for the general requirements for representing field trips and still match your Problem 1 answer.

Problem 4 (12 points) JSON Schema

Write a JSON schema specification appropriate for representing field trips. Your answer should be appropriate for the general requirements for representing field trips and still match your Problem 2 answer.

For the remainder of problems, use the "social" database we used in class. It is shown on the attached reference sheet. Only the Highschooler and Friend relation will be used in these questions. Remember that the Friend relation is designed to be symmetric: If Elbridge is a Friend of Buford, then Buford is a Friend of Elbridge.

Problem 5 (10 points) Relational algebra

Use relational algebra, with the operators Π for projection, σ for selection, and \times for Cartesian product, to encode the following SQL statement.

```
SELECT H.name, H.ID
FROM   Friend F, Highschooler H
WHERE  H.ID = F.ID1 AND H.name <> 'Kyle' ;
```

For the remaining problems, write SQL queries using the social database to generate the following tables (or output).

Problem 6 (10 points)

List the names of all Highschoolers in the 10th grade. Sort the list by the name.

Problem 7 (10 points)

List the grades and the number of students in each grade. Order the list by grade.

Problem 8 (10 points)

List the names of all pairs of students who are friends and in the same grade. List each pair only once. Also, within a row, list the friends in alphabetical order.

Problem 9 (10 points)

List the names of students whose names do not contain the letter 'e'.

Problem 10 (16 points)

List the names and IDs of all students who have two or more different friends with the same name. Order each listing first by name and then by ID. Do not list a student ID more than once. (There are two students with name Jordan in the Highschooler table. Do not explicitly use 'Jordan' in your query.)