

CPSC 304 – Introduction to Relational Databases – Summer 2004

Assignment 2

Given: Thursday, July 15, 2004

Max. Points: 50

Due: Monday, July 19, 2004

CPSC304 Dropbox, 12:30 P.M

Answer all questions.

The deadline is firm and there are no late turn-ins

1. Consider the following relational schema.

Emp(eid : integer, ename : string, age : integer, salary : real)

Works(eid : integer, did : integer, pct.time : integer)

Dept(did : integer, budget : real, managerid : integer)

Write the following queries in SQL.

- (a) Find the names and ages of each employee who works in both the Hardware department (with did 100) and the Software department (with did 200).
 - (b) Find the manager ids of manager who control the largest amount of money. (Note that controlling money is not the same as earning money).
 - (c) Find the managerid of managers who manage only departments which have a budget of at least 1 million dollars.
 - (d) Find the names of all employees whose salary exceeds the budget of all the departments that the employee works in.
 - (e) Find the enames of managers who manage department with the largest budgets.
 - (f) Find the enames of managers who manage only departments with budgets of at least 1 million dollars but atleast one department whose budget is less than 2 million dollars. ($5 \times 4 = 20$)
2. Let $R(A, B, C, D)$ be a relational schema. Let $F = \{AB \rightarrow C, BC \rightarrow D, CD \rightarrow A, AD \rightarrow B\}$ be a specified set of functional dependencies. Answer the following questions.
- (a) What are the nontrivial dependencies that follow from F ? Give only those dependencies which have a single attribute on the right hand side.
 - (b) What are all the keys of R ?
 - (c) What are the superkeys of R that are not keys? ($4 + 3 + 3 = 10$)
3. Let R be a relation schema with four attributes ABCD. Let the set of FDs that hold over R be $\{D \rightarrow B, AB \rightarrow D, AB \rightarrow C, C \rightarrow A\}$ and assume that these are the ONLY FDs that hold over R .
- (a) What are the candidate keys for R ?
 - (b) Which normal forms (1NF, 2NF, 3NF, BCNF) does R satisfy? Which conditions of the definition of the normal forms do the dependencies satisfy? ($5 + 5 = 10$)

4. Let $R(A, B, C, D, E)$ be a relation schema with 5 attributes. Let F be the following set of FDs that are given. $\{A \rightarrow B, ED \rightarrow A, BC \rightarrow E\}$.

(a) List all the keys for R .

(b) Is R in BCNF? If not, why?

(c) Is R in 3NF? If not, why?

(4 + 3 + 3 = 10)