Database Management System

Quals Exam — 80% for Pass

May 8, 2008

Question 1

(40 points) Jim enrolls in a database class and wants to get familiar with Oracle. He decides to develop a personal address book. He creates a table, called **addresses**, with the following information:

- **addresses**(first name, last name, address, home phone, cell phone, work phone, category)

Here, 'category' refers to whether the individual is a 'friend', 'family', or 'acquaintance' of Jim. Phone numbers are integer between 1000000000 and 9999999999. Other are character strings.

Jim knows that a table should have some keys for quick search. He creates different keys. The first one is by first name plus last name. The second one is by last name plus first name. The third one is by home phone. Answer the following (10 points for each Sub-Question):

- Write the SQL commands that help Jim create the table, its keys, and enforcing the constraint.
- List at least four errors that Jim may encounter while populating and/or updating his database. Syntax errors are not considered. Justify your answers.
- How can Jim avoid the mentioned problems?
- Is "first name, last name → address" a valid functional dependency of the table in Jim's original design? How about "cell phone → first name"? Justify your answers.

Question 2

(10 points) Suppose that Jim has two address books in his original design and would like to combine them into one address book. He does not want duplicate rows in his new address book (a table is said to contain duplicate rows if it contains two rows r and r' which are identical). Write a SQL command to help him achieve his goal. Explain why your command is correct.

Question 3

(25 points) Suppose that Jim would like to look for people whose cell phone numbers are between 5759008000 and 5759991111 from his table (as stated in Question 1). Answer the following.

- (15 points) Write a SQL command for this query. Assume that Jim's address book occupies F-pages and M-pages buffer memory. Estimate the cost of your query in term of the number of IO-costs relative to F and M.
- (10 points) If you were to create an index for the query, what type of index would you create and why?

Question 4

(25 points) Jim learns about XML and would like to encode his table as a XML file.

- (15 points) What would be an appropriate XML schema for Jim to use?
- (10 points) Assume that Jim follows your suggestion and uses your XML schema for his address book and stores the address book at

  `www.cs.nmsu.edu/~jim/addressbook.xml`.

  Write an XQUERY statement that allows Jim to get all people whose home phone number is between 5755211234 and 5755214321. The answer should return only the last name, the first name, and the phone number of individuals satisfying this condition, each in an XML element whose opening and closing tags are < `Person` > and < /`Person` > respectively.