Homework 8

1. Design an entity relationship model of a clinical laboratory information system (LIS). The lab is part of a hospital and performs blood and chemistry tests for in-patients only. Physicians place orders using the lab order entry interface and receive a unique test request number. The interface provides a menu of tests that the physician can pick from. Note that certain test names represent a collection of tests performed together often (Complete Blood Count includes RBC count, WBC count, hemoglobin measurement, hematocrit, etc.). The physician can also specify how urgent a test is. The urgency level may be different for various tests in one order. The specimens are collected in tubes at the patient's bedside, labeled with the test request number and dispatched to the lab. The lab receives the sample and a technician places it in the auto-analyzer that performs the tests. The auto-analyzer has an interface to the LIS and writes the results of the tests to the LIS database directly. The results are then sent electronically to the clinical data repository of the hospital. When the results are dispatched to the clinical system, the normal ranges of all tests are also added to the results. In case of *significantly* abnormal values (such as a very high or very low serum potassium), the lab information system automatically pages the physician with an alert.

   The proposed lab information system's database is going to be largely independent of other clinical information systems. Billing is handled by a separate system so you need not worry about it for this assignment. The E-R model should support the following functions:

   a. Online test-ordering by referring physicians

   b. Order status tracking such as test_ordered, specimen_received, test_performed, result_reported, order_canceled, specimen_inappropriate.

   c. Test results storage and reporting to the clinical data repository.

   d. Alerts for significantly abnormal values

   Read the above description very carefully as you design the model. Please document your E-R model appropriately and specify any other constraints and business rules. Indicate the unique identifiers for various entities. Grades for this assignment will be based on completeness of E-R model, clarity of model, and clarity and reasonable completeness of documentation. If you use non-standard notation (I don't encourage it but do it if it makes diagramming easier) for your E-R model, you must provide a description for your notation. **(50 points)**

2. Build a relational model for the E-R model you created in Question 1. Indicate primary and foreign keys. Send me the relations. **(25 points)**

3. In the Firebird DBMS, create a database called *lab* and add the relations you created in Question 2 as tables in that database. Send me the SQL statements you used to create these tables. **(25 points)**