Databases Homework: 2, 12, 20, 25, 27, 31, 40

1. Match the following terms and definitions:

* c. data
* b. database application
* l. constraint
* g. repository
* f. metadata
* m. data warehouse
* a. information
* j. user view
* k. database management system
* h. data independence
* e. database
* i. enterprise resource planning
* r. systems development life cycle
* o. prototyping
* d. enterprise data model
* q. conceptual schema
* p. internal schema
* n. external schema

1. Name the five phases of the traditional systems development life cycle, and explain the purpose and deliverables of each phase.
   1. Planning
      1. Purpose:
         1. To develop a preliminary understanding of a business situation and how information systems might help solve a problem or make an opportunity possible.
      2. Deliverables:
         1. Analyze current data processing
         2. Analyze the general business functions and their database needs
         3. Justify need for new data and databases in support of business
         4. Identify scope of database requirements for proposed information system
         5. Analyze overall data requirements for business function(s) supported by database
   2. Analysis
      1. Purpose:
         1. To analyze the business situation thoroughly to determine requirements, to structure those requirements, and to select among competing system features.
      2. Deliverables:
         1. Develop preliminary conceptual data model, including entities and relationships
         2. Compare preliminary conceptual data model with enterprise data model
         3. Develop detailed conceptual data model, including all entities, relationships, attributes, and business rules
         4. Make conceptual data model consistent with other models of information system
         5. Populate repository with all conceptual database specifications
   3. Design
      1. Purpose:
         1. To elicit and structure all information requirements; to develop all technology and organizational specifications.
      2. Deliverables:
         1. Analyze in detail the transactions, forms, displays, and inquiries (database views) required by the business functions supported by the database
         2. Integrate database views into conceptual data model
         3. Identify data integrity and security requirements, and populate repository
         4. Define database to DBMS (often generated from repository)
         5. Decide on physical organization of data
         6. Design database processing programs
   4. Implementation
      1. Purpose:
         1. To write programs, build databases, test and install the new system, train users, and finalize documentation.
      2. Deliverables:
         1. Code and test database processing programs
         2. Complete database documentation and training materials
         3. Install database and convert data from prior systems
   5. Maintenance
      1. Purpose:
         1. To monitor the operation and usefulness of the system, and to repair and enhance the system
      2. Analyze database and database applications to ensure that evolving information requirements are met
      3. Tune database for improved performance
      4. Fix errors in database and database applications and recover database when it is contaminated
2. For each of the following pairs of related entities, indicate whether (under typical circumstances) there is a one-to-many or many-to-many relationship. Then, using the shorthand notation introduced in the text, draw a diagram for each of the relationships.
   1. STUDENT and COURSE (students register for courses)
      1. Many-to-many
      2. Diagram
   2. BOOK and BOOK COPY (books have copies)
      1. One-to-many (unless we are meaning the concept of copies, which could apply to all books)
      2. Diagram
   3. COURSE and SECTION (courses have sections)
      1. One-to-many
      2. Diagram
   4. SECTION and ROOM (sections are scheduled in rooms)
      1. Many-to-many
      2. Diagram
   5. INSTRUCTOR and COURSE
      1. Many-to-many
      2. Diagram
3. A driver's license bureau maintains a database of licensed drivers. State whether each of the following represents data or metadata. If it represents data, state whether it is structured or unstructured data. If it represents metadata, state whether it is a fact describing a property of data or a fact describing the context of data.
   1. Driver's name, address, and birth date
      1. Data - structured
   2. The fact that the driver's name is a 30-character field
      1. Metadata - property
   3. A photo image of the driver
      1. Data - unstructured
   4. An image of the driver's fingerprint
      1. Data - unstructured
   5. The make and serial number of the scanning device that was used to scan the fingerprint
      1. Metadata - context
   6. The resolution (in megapixels) of the camera that was used to photograph the driver
      1. Metadata - context
   7. The fact that the driver's birth date must precede today's date by at least 16 years.
      1. Metadata - property
4. Figure 1-21 shows an enterprise data model for a music store.
   1. What is the relationship between Album and Store (one-to-one, many-to-many, or one-to-many)?
      1. one-to-many
   2. What is the relationship between Artist and Album?
      1. one-to-many
   3. Do you think there should be a relationship between Artist and Store?
      1. There could be a one-to-many relationship between Artist and Stores. The store can sell multiple artists.
5. Consider your business school or other academic unit as a business enterprise.
   1. Define several major data entity types and draw a preliminary enterprise data model (similar in notation to Figure 1-3a)
      1. Entities
         1. Department
         2. Professors
         3. Classes
         4. Students
      2. Model
   2. Would your business school or academic unit benefit from a multitiered architecture for data? Why or why not?
      1. Yes, because there are different types of entities involved and there is a hierarchical structure to the department.
6. Consider the SQL query in Figure 1-19
   1. How is Sales to Date calculated?
      1. The OrderQuntity times the ProductPrice
   2. How would the query have to change if Helen Jarvis wanted to see the results for all of the product lines, not just the Home Office product line?
      1. AND Product.ProductLineName = ALL;