Part One: Requirement Specification and Conceptual Design

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- Description

In Part One, you will follow the software design methodology of a database application and carry out conceptual design of a database application and its conceptual database schema. You should identify an application domain and a (possibly fictional) organization in this application domain for which your team is to design and implement a database application to support its business operations. You need to describe the business of the organization and its business workflow; specify the requirements for your database application and your database; Specify a conceptual design of the application as a set of functions/procedures and a conceptual database schema as an E/R diagram and possibly additional constraints. We now discuss specific issues and requirements.

Application Domain and organization.

You should choose an application domain in which the normal operations of an organization typically require to process large set of data in non-trivial ways (that is, not only they retrieve data, but they also update data). It is not sufficient just to browse the database or just to involve a small set of data. Second, you should identify operations involved in the business model or workflow of the organization that naturally require to collect, update and use data. It is important to include activities that cause data to change

explicitly or implicitly. Third, you should be able to generate or otherwise obtain realistic data for the organization you identified.

Application Program

You need to be aware of the complexity of your application program. It is not realistic to build a complex real-world application program in this project. On the other hand, it is insufficient to develop a trivial toy application, either. To design an application with an appropriate complexity, you should first identify two to three types of users of the application, and then identify several (e.g., 3 to 5) types of activities that your program will support for each type of users.

Conceptual Design of Database

Your database design should be based on a requirement analysis. You should first write a description for each type of users and each type of activities. Then, you should create a list of data modeling requirements. Next, you will create an E/R diagram of your database schema. You may have to adjust your design several times before it is finalized with an appropriate complexity. I want to emphasize that a good design at beginning of the project is extremely important for the success of the entire project. To give you a guideline, I would suggest that your E/R diagram contain about 5 entity types and a similar number of relationship types. Your specific application may require a slight variation to this general estimate. To the extent that is appropriate to your specific application, your E/R diagram should include various kinds of relationships (one-to-many, many-to-many, etc.) and attributes (string, integer, etc.). However, using advanced features, such as weak entity type, IS-A relationship, etc., is not a requirement.

The following list of sample application domains may help you start thinking about your project. You are encouraged to find your own application domain.

Movie Rental Website: Typical entities in this domain may include movies, actors, directors, genres, playing times, reviews, user accounts, rental invoice, pickup and return locations and times. There exist several sources on the Web where you can find data to populate a database. You can support various queries such as finding specific playing times, finding movies in San Antonio directed by a given director. You can also support updates to movie reviews (e.g., viewers giving their own opinions) and rental history. Another

functionality is to provide personal profiles of people (i.e., the movies they like) and then try to recommend movies to them based on profiles of viewers with similar tastes.

On-Line Books Store: In this domain, the entities may include books, authors, and topics (which may have a complex hierarchy). You may also model various attributes of the authors, the institutions they belong to, etc. You can support a buy/sell service of used books, books used in specific university courses. A personal profile, similar to the one for movies is also a possibility. Pointing an interested buyer to a web source to buy a book is also an interesting option.

Apartment Rental Website: This domain would require the modeling of apartments and their properties, areas of town and their various properties (e.g., bus lines, crime rate, distance from various landmarks). You would provide an interface for offering apartments for rent, and finding apartments. Some data can be found from local newspapers, realtor web sites, and other sources.

Social Network Website: In this domain, the basic entities would be users, groups, topics, friends, discussion rooms. You can model their various properties and relationships. Users can create new groups, start discussion on new topics, make new friends, search for users with similar interests or in a specific area.

What to Hand In

Hand in a well-formatted written report that includes following items.

Cover Page

The cover page should have an interesting title of your project, your assigned team ID and the names of all team members. The project title should clearly identify your application domain and your application program. Do not use titles such as "project 1" or "cs3743 project, part 1". Your team ID is assigned after I receive the list of names of your teammates.

General Description of Application Domain

In this section, you should describe your application domain, your (fiction or real) organization, the business or operation of the organization. This description should be general, informative and informal. You may want to point out any unique or especially difficult aspect of your application. Your

description will be graded on content, clarity, and conciseness. (You may want to discuss it with me before hand it in).

Conceptual Design of your application Program

In this section, you should describe proposed functionality of your application program. You should describe the types of users of your program. The functions that your program will support for different types of users. To give you some idea, consider a retail business domain. There may be three types of users: customers, salespersons, and the shop owner. The application program may provide functions to support activities for each type of users. For example, a customer can use the program to find product information and prices; and to compare products on some predetermined criteria. A salesperson can use the program to complete sales transactions, to get customer information, to check inventory, etc. A shop owner may use the program to analyze sales, to check outstanding orders, and to inspect each business transaction. Obviously, your database must contain necessary information to support all these activities, and your application program needs to implement these supports.

Conceptual Database Schema

In this section, you provide an E/R diagram of your database. You should create a list of data modeling requirements, and translate it into an E/R diagram that describe the schema of a database. The E/R diagram should be drawn on a single piece of paper and contains clearly labeled, meaningful and suitable constraints. Pay special attention to follow the convention of E/R model. You should also list on a separate piece of paper any business rule that cannot be adequately specified in the E/R model.

Be aware of following pitfalls in designing E/R diagram.

Design E/R diagram by translating a relational schema. People who knows relational database, but are not familiar with E/R model often create a relational schema first and translate it into an E/R diagram. This will always give you a bad E/R model and you may come up a bad design that the E/R model was designed to avoid. Design an E/R diagram to model organization structure. When design E/R diagram based on data requirements, some people pay attention to organizational structure rather than information needs. If you are not sure, ask yourself what operations need to use the entity type or relationship type, and why that type of entities or relationships need

to be stored in the database. The E/R diagram should contain the entire schema. You should maintain a electronic copy of the report, since it is likely you will have to revise some part of your design, and you will also need to include it in reports of subsequent parts of the project. However, you must hand in a hard copy so I can provide you feedback.