**ST.XAVIER’S COLLEGE**

MAITIGHAR, KATHMANDU

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**Database Management System**

Assignment #4

Submitted By:

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Submitted to:

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1. **ER Diagram with 1 Case Study:**
2. **Design**
   1. **Functional Design**

The first phase of designing a database is requirement collection and analysis. During this step, the database designers interview prospective database users to understand and document their data requirements. The result of this step is a concisely written set of users’ requirements. These requirements should be specified in as detailed and complete a form as possible. In parallel with specifying the data requirements, it is useful to specify the known functional requirements of the application. These consist of the user defined operations (or transactions) that will be applied to the database, including both retrievals and updates. In software design, it is common to use data flow diagrams, sequence diagrams, scenarios, and other techniques to specify functional requirements. [1]

* 1. **Database Design**
     1. **Conceptual Database Design**

Once all the requirements have been collected and analyzed, the next step is to create a conceptual schema for the database, using a high-level conceptual data model. This step is called conceptual design. The conceptual schema is a concise description of the data requirements of the users and includes detailed descriptions of the entity types, relationships, and constraints; these are expressed using the concepts provided by the high-level data model. Because these concepts do not include implementation details, they are usually easier to understand and can be used to communicate with the non-technical users. The high-level conceptual schema can also be used as a reference to ensure that all users’ data requirements are met and that requirements do not conflict. This approach enables database designers to concentrate on specifying the properties of the data, without being concerned with the storage details. Consequently, it is easier for them to create a good conceptual database design. [1]

* + 1. **Logical Database Design**

The next step in database design is the actual implementation of the database, using a commercial DBMS. Most current commercial DBMSs use an implementation data model such as the relational or object-relational database model, so the conceptual schema is transformed from high-level data model into the implementation data model. This step is called logical design or data model mapping; its result is database schema in the implementation data model of the DBMS. [1]

* + 1. **Physical Database Design**

The last step is physical design phase, during which the internal storage structures, indexes, access paths, and file organizations for the database files are specified. In parallel with these activities, application programs are designed and implemented as database transactions corresponding to the high-level transaction specifications. [1]

1. **Characteristics of Relations**
2. No Duplicate Tuples - A relation cannot contain two or more tuples which have the same values for all the attributes. i.e., in any relation, every row is unique.

• Tuples are unordered - The order of rows in a relation is immaterial.

• Attributes are unordered - The order of columns in a relation is immaterial.

• Attribute Values are Atomic - Each tuple contains exactly one value for each attribute.

It may be noted that many of the properties of relations follow the fact that the body of a relation is a mathematical set. [2]

1. **ER to Relational Mapping Algorithm**
   1. **Mapping of regular entity types**
   2. **Mapping of weak entity types**
   3. **Mapping of binary 1:1 relational types**
   4. **Mapping of binary 1:M relational types**
   5. **Mapping of binary M:M relational types**
   6. **Mapping of Multi-valued attributes**
   7. **Mapping of N-ary relationship types**

**REFERENCE**

[1] Ramez Elmasri. “Uding High-Level Conceptual Data Model for Database Design ”. *Fundamentals of Database System FifthEdition.2008.*

[2] The Community. “Characteristics of relations in relational database model?”. Link: http://www.answers.com/Q/Characteristics\_of\_relations\_in\_relational\_database\_model