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**Database Management System Assignment #4**

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ER DIAGRAM WITH ONE CASE STUDY

DESIGN

**FUNCTIONAL DESIGN**

Functional Design is a paradigm used to simplify the design of hardware and software devices such as computer software and increasingly, 3D models. A functional design assures that each modular part of a device has only one responsibility and performs that responsibility with the minimum of side effects on other parts. Functionally designed modules tend to have low coupling.

**DATABASE DESIGN**

Database design is the process of producing a detailed data model of a database.The term database design can be used to describe many different parts of the design of an overall database system. Principally, and most correctly, it can be thought of as the logical design of the base data structures used to store the data. In the relational model these are the tables and view. In an object database the entities and relationships map directly to object classes and named relationships. However, the term database design could also be used to apply to the overall process of designing, not just the base data structures, but also the forms and queries used as part of the overall database application within the database management system (DBMS)

**CONCEPTUAL DATABASE DESIGN**

Once all the requirements have been collected and analyzed, the next step is to create a conceptual shema for the database, using a high level conceptual data model. This phase is called conceptual design.

The result of this phase is an Entity-Relationship (ER) diagram or UML class diagram. It is a high-level data model of the specific application area. It describes how different entities (objects, items) are related to each other. It also describes what attributes (features) each entity has. It includes the definitions of all the concepts (entities, attributes) of the application area.

During or after the conceptual shema design, the basic data model operations can be used to specify the high-level user operations identified during the functional analysis. This also serves to confirm that the conceptual schema meets all the indenfied functional requirements.

There are several notations to draw the ER diagram.

**LOGICAL DATABASE DESIGN**

The result of the logical design phase (or data model mapping phase) is a set of relation shcemas. The ER diagram or class diagram is the basis for these relation schemas.

To create the relation shemas is quite a mechanical operation. There are rules how the ER model or class diagram is transferred to relation shemas.

The relation schemas are the basis for table definitions. In this phase (if not done in previous phase) the primary keys and foreign keys are defined.

**PHYSICAL DATABASE DESIGN**

The goal of the last phase of database design, physical design, is to implement the database. At this phase one must know which database management system (DBMS) is used. For example, different DBMS's have different names for datatypes and have different datatypes.

The SQL clauses to create the database are written. The idexes, the integrity constraints (rules) and the users' access rights are defined.

Finally the data to test the database is added in.

**CHARACTERISTICS OF RELATION**

* Data in the relational database must be represented in tables, with values in columns within rows.
* Data within a column must be accessible by specifying the table name, the column name, and the value of the primary key of the row.
* 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.

ER TO RELATIONAL MAPPING ALGORITHM

MAPPING OF REGULAR ENTITY TYPE

MAPPING OF WEAK ENTITY TYPE

MAPPING OF BINARY 1:1 TYPE

MAPPING OF 1:M RELATION TYPE

MAPPING OF M:M RELATION TYPE

MAPPING OF MULTIVALUED ATTRIBUTES

MAPPING OF N-ARY RELATIONSHIP TYPES