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Practical No. 3

Aim: Create the E-R Model from given problem statement.

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AIM: Create the E-R Model from given problem statement.

OBJECTIVE/EXPECTED LEARNING OUTCOME:

- Identify entity sets, their attributes, and various relationships
- Represent the data model through ER diagram

HARDWARE AND SOFTWARE REQUIRMENTS:

Hardware Requirement

- Processor: Dual Core
- RAM: 1GB
- Hard Disk Drive: > 80 GB

Software Requirement

- Operating System – Windows
- StarUML

THEORY

Developing databases is a very important task to develop a system. Before going to form exact database, tables and establishing relationships between them, we conceptually or logically can model our database using ER diagrams.

Entity Relationship Model

Entity-Relationship model is used to represent a logical design of a database to be created. In ER model, real world objects (or concepts) are abstracted as entities, and different possible associations among them are modelled as relationships.

For example, student and school -- they are two entities. Students study in school. So, these two entities are associated with a relationship "Studies in".

As another example, consider a system where some job runs every night, which updates the database. Here, job and database could be two entities. They are associated with the relationship "Updates".

Entity Set and Relationship Set

An entity set is a collection of all similar entities. For example, "Student" is an entity set that abstracts all students. Ram, John are specific entities belonging to this set. Similarly, a "Relationship" set is a set of similar relationships.

Attributes of Entity

Attributes are the characteristics describing any entity belonging to an entity set. Any entity in a set can be described by zero or more attributes.

For example, any student has got a name, age, an address. At any given time a student can study only at one school. In the school he would have a roll number, and of course a grade in which he studies. These data are the attributes of the entity set Student.

Keys

One or more attribute(s) of an entity set can be used to define the following keys:

- **Super key:** One or more attributes, which when taken together, helps to uniquely identify an entity in an entity set. For example, a school can have any number of students. However, if we know grade and roll number, then we can uniquely identify a student in that school.
- **Candidate key:** It is a minimal subset of a super key. In other words, a super key might contain extraneous attributes, which do not help in identifying an object uniquely. When such attributes are removed, the key formed so is called a candidate key.
- **Primary key:** A database might have more than one candidate key. Any candidate key chosen for a particular implementation of the database is called a primary key.
- **Prime attribute:** Any attribute taking part in a super key

Weak Entity

An entity set is said to be weak if it is dependent upon another entity set. A weak entity can't be uniquely identified only by it's attributes. In other words, it doesn't have a super key.For example, consider a company that allows employees to have travel allowance for their immediate family. So, here we have two entity sets: employee and family, related by "Can claim for". However, family doesn't have a super key. Existence of a family is entirely dependent on the concerned employee. So, it is meaningful only with reference to employee.

Mapping Cardinalities

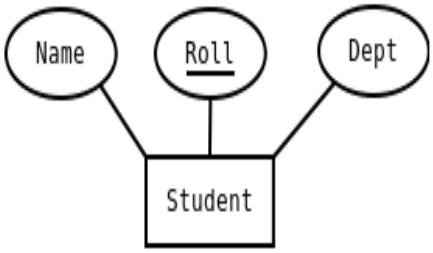
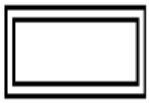
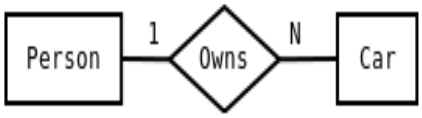
One of the main tasks of ER modelling is to associate different entity sets. Let's consider two entity sets E1 and E2 associated by a relationship set R. Based on the number of entities in E1 and E2 are associated with, we can have the following four type of mappings:

- **One to one:** An entity in E1 is related to at most a single entity in E2, and vice versa
- **One to many:** An entity in E1 could be related to zero or more entities in E2. Any entity in E2 could be related to at most a single entity in E1.
- **Many to one:** Zero or more number of entities in E1 could be associated to a single entity in E2. However, an entity in E2 could be related to at most one entity in E1.
- **Many to many:** Any number of entities could be related to any number of entities in E2, including zero, and vice versa.

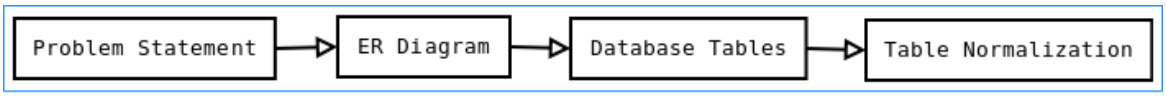
ER Diagram

From a given problem statement we identify the possible entity sets, their attributes, and relationships among different entity sets. Once we have this information, we represent them pictorially, called an entity-relationship (ER) diagram.

Graphical Notations for ER Diagram

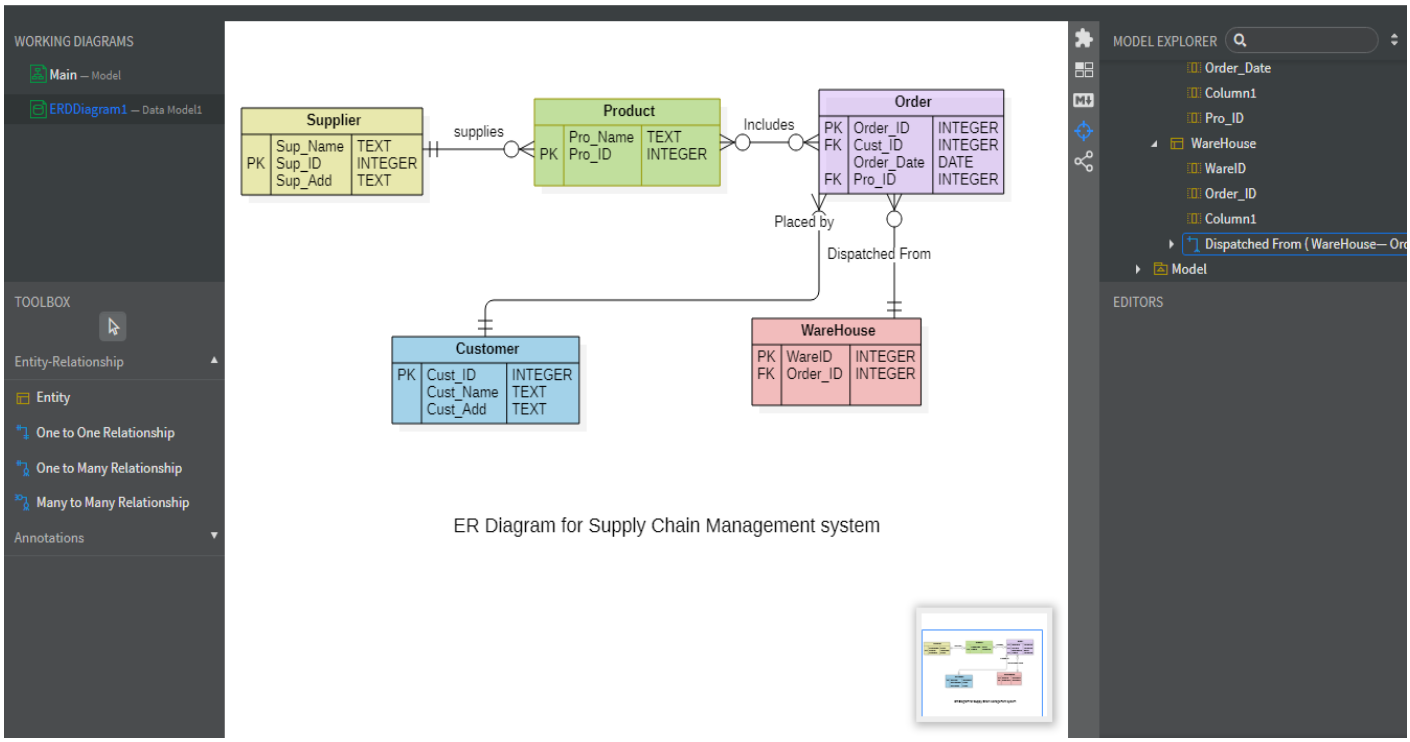
Term	Notation	Remarks
Entity set		Name of the set is written inside the rectangle
Attribute		Name of the attribute is written inside the ellipse
Entity with attributes		Roll is the primary key; denoted with an underline
Weak entity set		
Relationship set		Name of the relationship is written inside the diamond
Related enity sets		
Relationship cardinality		A person can own zero or more cars but no two persons can own the same car
Relationship with weak entity set		

Importance of ER modelling



Given a problem statement, the first step is to identify the entities, attributes and relationships. We represent them using an ER diagram. Using this ER diagram, table structures are created, along with required constraints. Finally, these tables are normalized in order to remove redundancy and maintain data integrity. Thus, to have data stored efficiently, the ER diagram is to be drawn as much detailed and accurate as possible.

OBSERVATION (Students should attach screenshot of assigned problem statement):



ER Diagram for Supply Chain Management system

CONCLUSION:

DISCUSSION QUESTIONS?

1. What is an ER Diagram?

2. Can you explain the different symbols used in an ER diagram?

3. How do you represent weak entities in ER diagrams?

4. How can cardinality be applied to relationships in ER diagrams?

5. What is an attribute? How is it represented in an ER diagram?

REFERENCES:

- http://vlabs.iitkgp.ernet.in/se/1/
- https://sites.google.com/view/ait-se/Home/practicals
- https://www.javatpoint.com/software-requirement-specifications