Assignment No .1

Title of Assignment: ER Modeling and Normalization

Decide a case study related to real time application in group of 2-3 students and formulate a problem statement for application to be developed. Propose a Conceptual Design using ER features using tools like ERD plus, ER Win etc. (Identifying entities, relationships between entities, attributes, keys, cardinalities, generalization, specialization etc.) Convert the ER diagram into relational tables and normalize Relational data model.

Note: Student groups are required to continue same problem statement throughout all the assignments in order to design and develop an application as a part Mini Project. Further assignments will be useful for students to develop a backend for system. To design front end interface students should use the different concepts learnt in the other subjects also.

Course Objective: To develop Database programming skills

Course Outcome:

C306.1 Design E-R Model for given requirements and convert the same into database tables

C306.2 Design schema in appropriate normal form considering actual requirements

Software Required: - Any tool for drawing ER diagram

Theory: -

Entity Relationship (E R) Model : The Entity Relationship (ER) model is one of several high-level, or semantic, data models used in database design. The goal is to create a simple description of the data that closely matches how users and developers think of the data

A database can be modeled as : a collection of entities, relationship among entities.

An Entity is real-world object that exists and is distinguishable from other objects.

A relationship is an association among several (Two or more) entities.

Entities are represented by means of their properties, called attributes.

An entity set is a set of entities of the same type that share the same properties.

Each entity set has a Key.

Each Attribute has a Domain.

Types of Attributes

Simple attribute − Simple attributes are atomic values, which cannot be divided further.

For example, a Customer's ID number is an atomic value of 6 digits.

Composite attribute − Composite attributes are made of more than one simple attribute.

For example, a customer's complete name may have first-name, middle-initial and last-name.

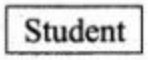
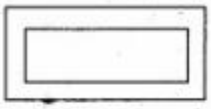
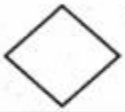
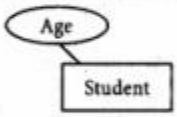
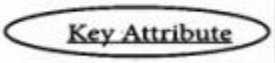
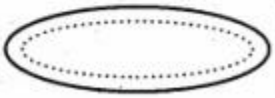
Single-value attribute − Single-value attributes contain single value.

For example − Customer_ID, Social_Security_Number.

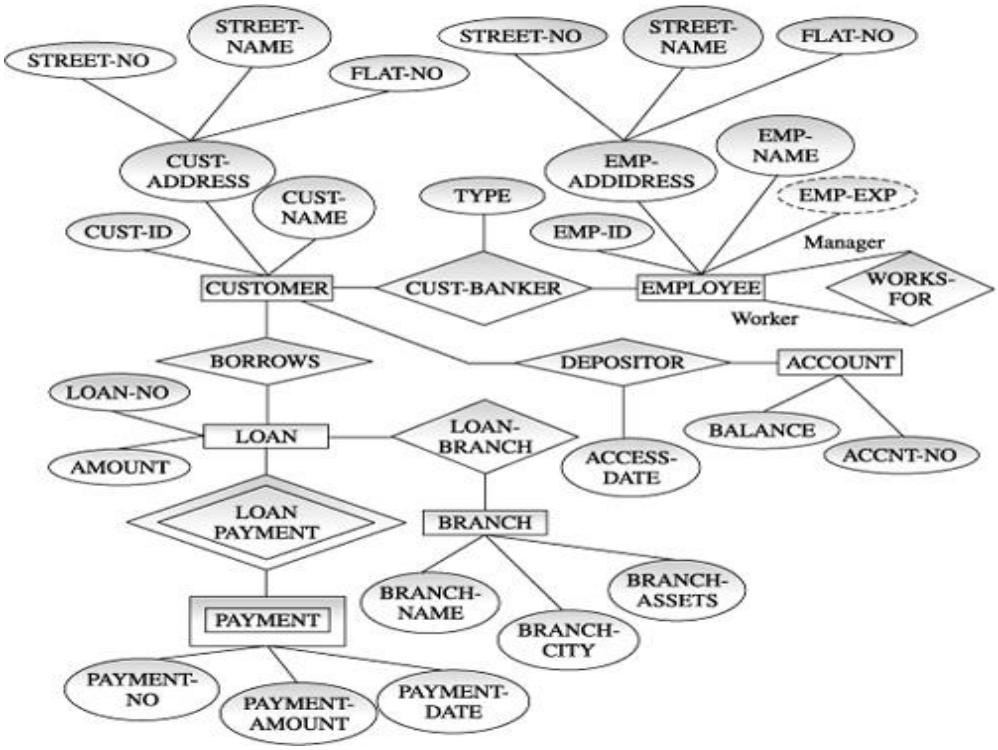
Multi-value attribute − Multi-value attributes may contain more than one values.

For example, a person can have more than one phone number, email_address, etc.

Derived attribute − Derived attributes are the attributes that do not exist in the physical database, but their values are derived from other attributes present in the database. For example, age can be derived from date_of_birth

ER Component	Description (how it is represented)	Notation
Entity – Strong	Simple rectangular box	
Entity – Weak	Double rectangular boxes	
Relationships	Rhombus symbol - Strong	
between Entities	Rhombus within rhombus – Weak	
Attributes	Ellipse Symbol connected to the entity	
Key Attribute for Entity	Underline the attribute name inside Ellipse	
Derived Attribute for	Dotted ellipse inside main ellipse Entity	
Multivalued Attribute	Double Ellipse for Entity	

Example of ER diagram



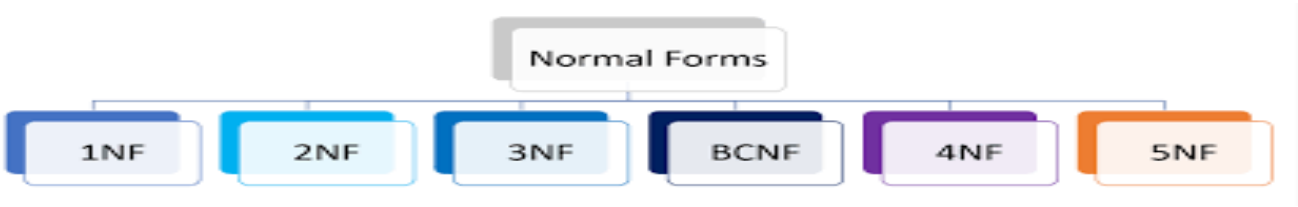
Relational Model

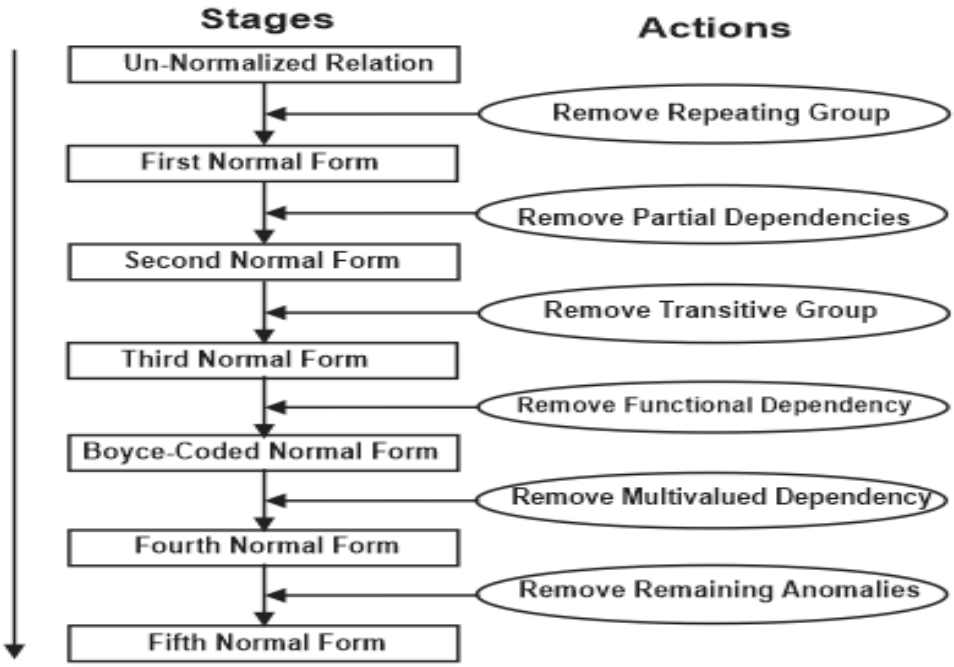
The relational model is a depiction of how each piece of stored information relates to the other stored information. It shows how tables are linked, what type of the links are between tables, what keys are used, what information is referenced between tables. It's an essential part of developing a normalized database structure to prevent repeat and redundant data storage. Different types of keys: ¬ A super key is a set of one or more attributes which; taken collectively, allow us to identify uniquely an entity in the entity set. ¬ A primary key is a candidate key(there may be more than one) chosen by the DB designer to identify entities in an entity set. ¬ A super key may contain extraneous attributes, and we are often interested in the smallest super key. A super key for which no subset is a super key is called a candidate key. ¬ An entity does not posses sufficient attributes to form a primary ket is called a weak entity set. One that does have a primary key is called a strong entity set. ¬ A foreign key is a field in a relational table that matches the primary key column of another table. The foreign key can be used to cross-reference tables.

Normalization

Database normalization is a technique for designing relational database tables to minimize duplication of information and, in so doing, to safeguard the database against certain types of logical or structural problems, namely data anomalies. In this we will write the normalization tables that is entities of "Roadway Travels." Normalization: In relational databases, normalization is a process that eliminates redundancy, organizes data efficiently; Normalization is the process of efficiently organizing data in a database. There are two goals of the normalization process: eliminating redundant data(for example, storing the same data in more than one table) and ensuring data dependencies make sense(only storing related data in a tablet). Both of these are worthy goals as they reduce the amt of space a database consumes and ensure that data is logically stores. The Normal Form: the database community has developed a series of guidelines for ensuring that databases are normalized. These are referred to as normal forms and are numbered from one (the lowest form to

normalization, referred to as first form or INF) through five(fifth normal form of SNF). In practical applications, you'll often see INF, 2NF, and 3NF along with occasional 4NF. Fifth normal form is very rarely seen and won't be discussed in this article. It's important to point out that they are guidelines and guidelines only. Occasionally, it becomes necessary to stray from them to meet practical business requirements. However, when variations take place, it's extremely important to evaluate any possible requirements they could have on your system and account for possible inconsistencies. That said, let's explore the normal form.





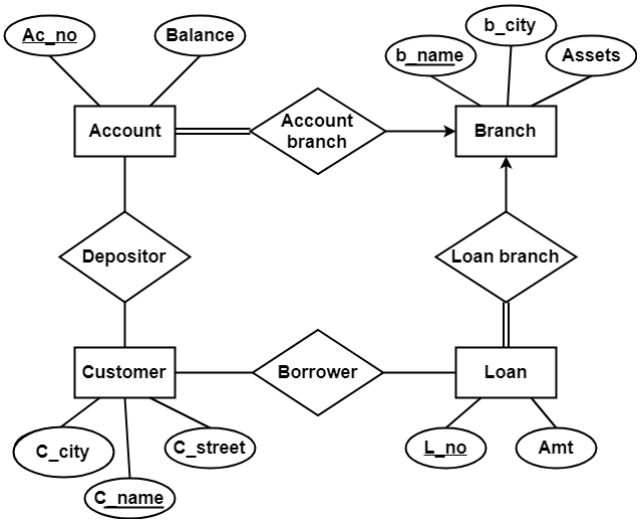
Conclusion:

Students are able to design ER diagram and convert it into table with Normalized tables.

Activity to be Submitted by Students

1. Draw an E-R Diagram For an ATM System.

2. Convert below diagram to tables.

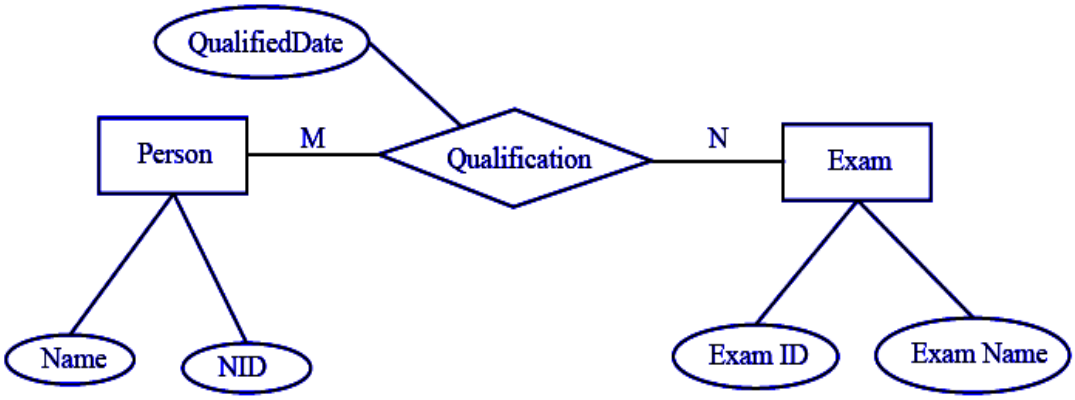


3. Normalize below table till 3 NF

FULL NAMES	PHYSICAL ADDRESS	MOVIES RENTED	SALUTATION
Janet Jones	First Street Plot No 4	Pirates of the Caribbean, Clash of the Titans	Ms.
Robert Phil	3rd Street 34	Forgetting Sarah Marshal, Daddy's Little Girls	Mr.
Robert Phil	5th Avenue	Clash of the Titans	Mr.

4.

Consider the following Relationship Entity Diagram(ERD)



Which of the following possible relations will not hold if the above ERD is mapped into a relation model?

Person (NID, Name)

Qualification (NID, ExamID, QualifiedDate)

Exam (ExamID, NID, ExamName)

Exam (ExamID, ExamName)