

Group A - SQL and PL/SQL
Assignments

Assignment No 1

Title: ER Modeling and Normalization:

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 models.

Objective: To understand the concept of ER model and convert into relational tables.

Software Required: ERDplus online tool.

Theory:

What is ER Diagram?

The Entity Relational Model is a model for identifying entities to be represented in the database and representation of how those entities are related. The ER data model specifies an enterprise schema that represents the overall logical structure of a database graphically.

The Entity Relationship Diagram explains the relationship among the entities present in the database. ER models are used to model real-world objects like a person, a car, or a company and the relation between these real-world objects. In short, ER Diagram is the structural format of the database.









Why Use ER Diagrams In DBMS?

- ER diagrams are used to represent the E-R model in a database, which makes them easy to be converted into relations (tables).
- ER diagrams provide the purpose of real-world modeling of objects which makes them intently useful.
- ER diagrams require no technical knowledge and no hardware support.
- These diagrams are very easy to understand and easy to create even for a naive user.
- It gives a standard solution for visualizing the data logically.

Symbols Used in ER Model:

ER Model is used to model the logical view of the system from a data perspective which consists of these symbols:

- Rectangle: Rectangles represent Entities in ER Model.
- Ellipse: Ellipses represent Attributes in ER Model.
- Diamond: Diamonds represent Relationships among Entities.
- Line: Lines represent attributes to entities and entity sets with other relationship types.
- Double Ellipse: Double Ellipses represent Multi-Valued Attributes.
- Double Rectangle: Double Rectangle represents a Weak Entity.

Component	Symbol
Entity	
Relationship	
Attribute	
Multivalued-Attribute	
Key Attribute	
Composite Attribute	
Weak Entity	
Weak Entity Relationship	

❖ **Entity :**

An Entity may be an object with a physical existence – a particular person, car, house, or employee – or it may be an object with a conceptual existence – a company, a job, or a university course.

1. Strong Entity

A Strong Entity is a type of entity that has a key Attribute. Strong Entity does not depend on other Entity in the Schema. It has a primary key, that helps in identifying it uniquely, and it is represented by a rectangle. These are called Strong Entity Types.

2. Weak Entity

An Entity type has a key attribute that uniquely identifies each entity in the entity set. But some entity type exists for which key attributes can't be defined. These are called Weak Entity types.

❖ **Attributes :**

Attributes are the properties that define the entity type. For example, Roll_No, Name, DOB, Age, Address, and Mobile_No are the attributes that define entity type Student.

1. Key Attribute

The attribute which uniquely identifies each entity in the entity set is called the key attribute. For example, Roll_No will be unique for each student.

2. Composite Attribute

An attribute composed of many other attributes is called a composite attribute. For example, the Address attribute of the student Entity type consists of Street, City, State, and Country.

3. Multivalued Attribute

An attribute consisting of more than one value for a given entity. For example, Phone_No (can be more than one for a given student).

4. Derived Attribute

An attribute that can be derived from other attributes of the entity type is known as a derived attribute. e.g.; Age (can be derived from DOB).

❖ Relationship:

A Relationship represents the association between entity types.

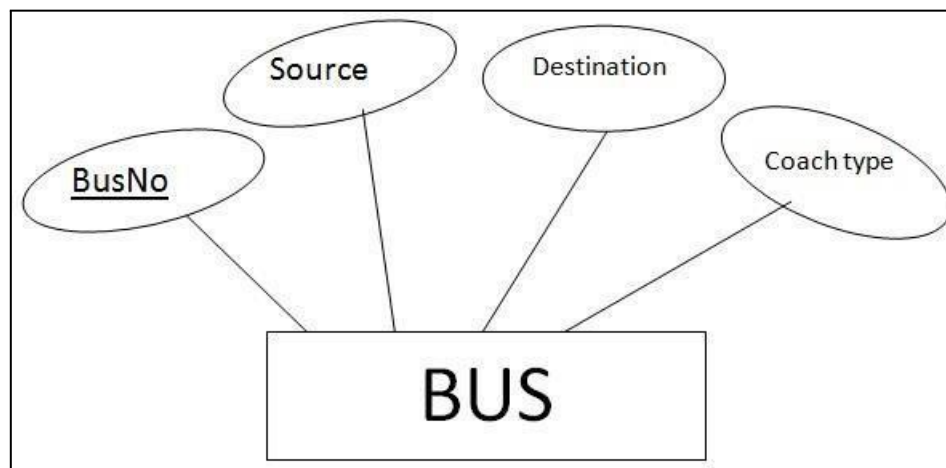
How to Draw ER Diagram?

- The very first step is Identifying all the Entities, and place them in a Rectangle, and labeling them accordingly.
- The next step is to identify the relationship between them and pace them accordingly using the Diamond, and make sure that, Relationships are not connected to each other.
- Attach attributes to the entities properly.
- Remove redundant entities and relationships.
- Add proper colors to highlight the data present in the database.

E-R Model

Bus

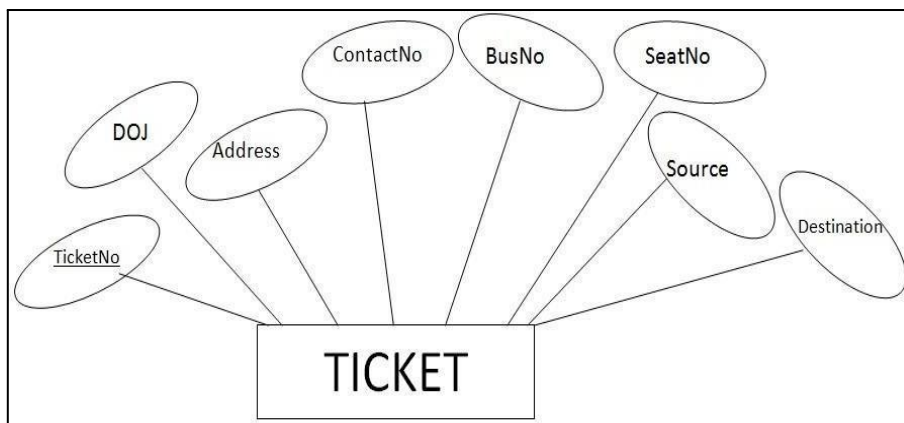
- BusNo
- Source
- Destination
- CoachType



SCHEMA

Ticket

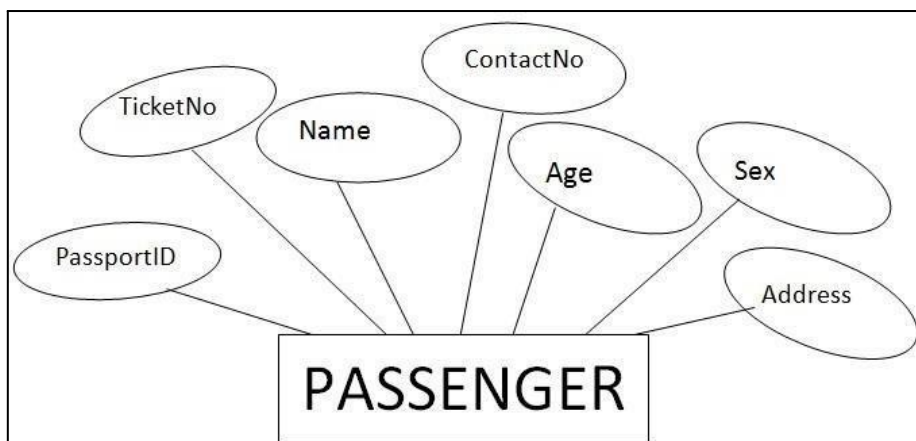
- TicketNo
- DOJ
- Address
- ContactNo
- BusNo
- SeatNo
- Source
- Destination



SCHEMA

Passenger

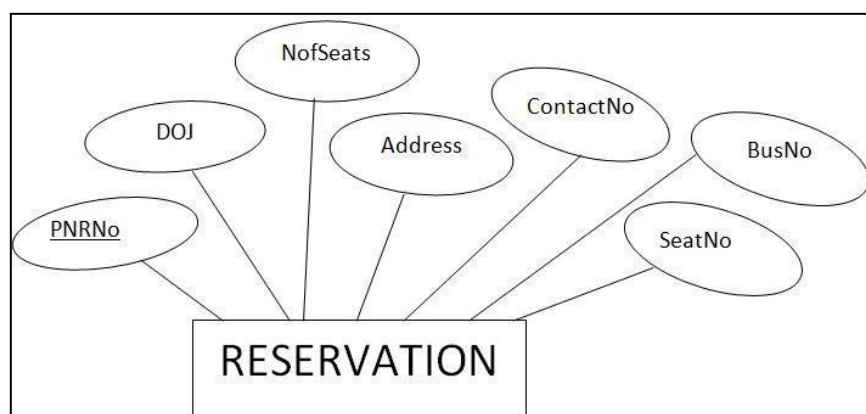
- PassportID
- TicketNo
- Name
- ContactNo
- Age
- Sex
- Address



SCHEMA

Reservation

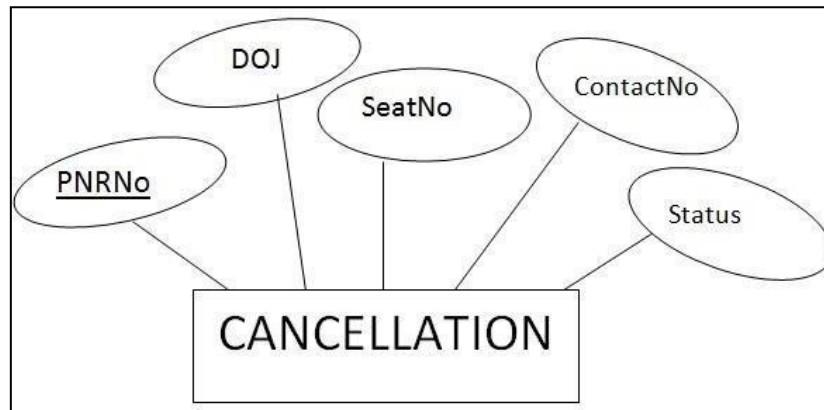
- PNRNo
- DOJ
- No_of_seats
- Address
- ContactNo
- BusNo
- SeatNo



SCHEMA

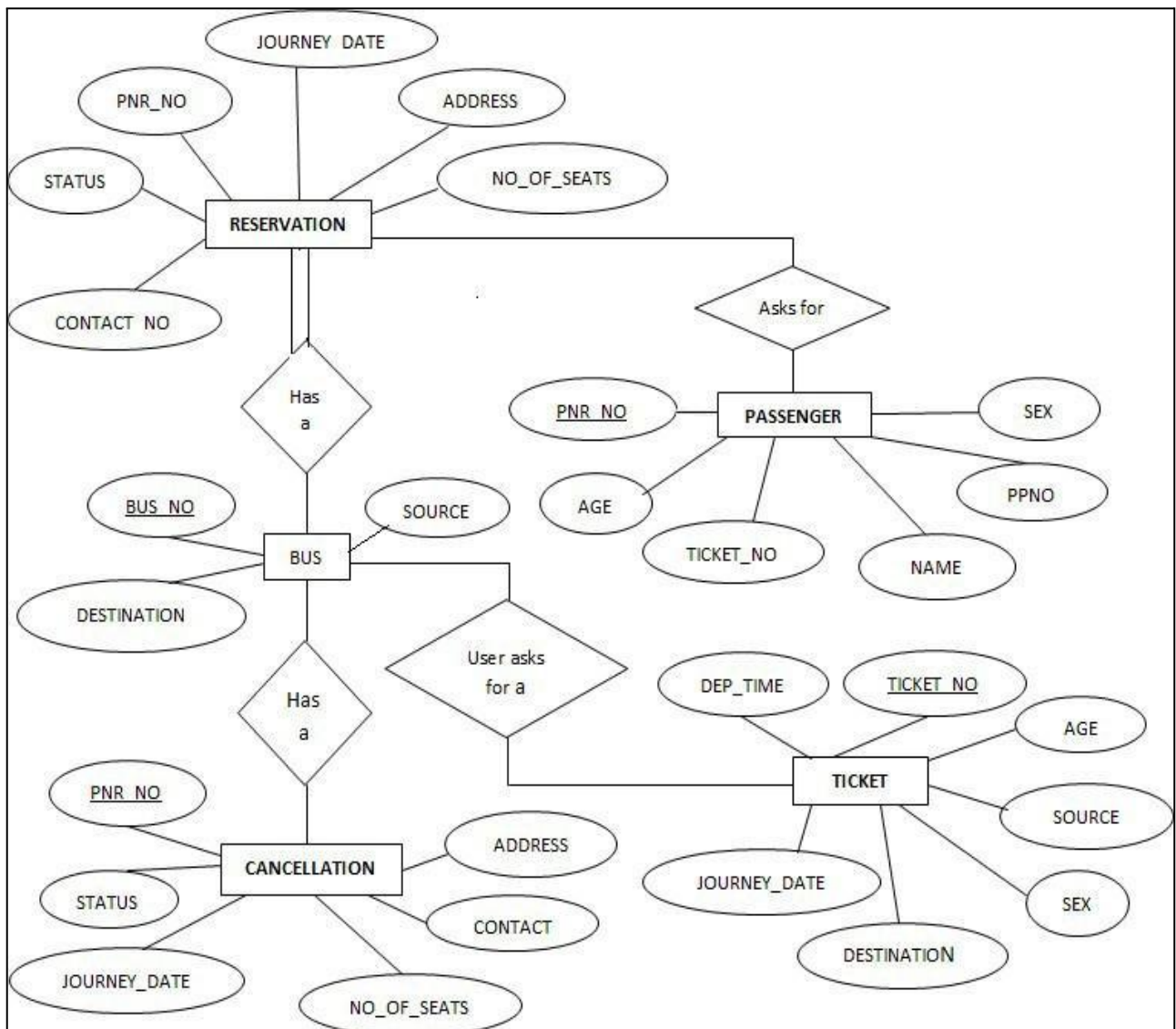
Cancellation

- PNRNo
- DOJ
- SeatNo
- ContactNo
- Status



SCHEMA

CONCEPT DESIGN WITH E-R MODEL



★ To Represent all the entities (Strong, Weak) in tabular fashion. Represent relationships in a tabular fashion.

Bus:

ColumnName	Datatype	Constraints	Type of Attributes
BusNo	Varchar(10)	Primary key	Single-value
Source	Varchar(20)		Single-value
Destination	Varchar(20)		Simple
CoachType	Varchar(10)		Simple

Ticket:

ColumnName	Datatype	Constraints	Type of Attributes
TicketNo	Varchar(20)	Primary Key	Single-valued
DOJ	Date		Single-valued
Address	Varchar(20)		Composite
ContactNo	Integer		Multi-valued
BusNo	Varchar(10)	Foreign Key	Single-valued
SeatNo	Integer		Simple
Source	Varchar(10)		Simple
Destination	Varchar(10)		Simple

Passenger:

ColumnName	Datatype	Constraints	Type of Attributes
PassportID	Varchar(15)	Primary Key	Single-valued
TicketNo	Varchar(20)	Foreign Key	Single-valued
Name	Varchar(20)		Composite
ContactNo	Varchar(20)		Multi-valued
Age	Integer		Single-valued
Sex	character		Simple
Address	Varchar(20)		Composite

Reservation:

ColumnName	Datatype	Constraints	Type of Attributes
PNRNo	Varchar(20)	Primary Key	Single-valued

DOJ	date		Single-valued
No_of_Seats	Integer		Simple
Address	Varchar(20)		Composite
ContactNo	Varchar(10)		Multi-valued
BusNo	Varchar(10)	Foreign Key	Single-valued
SeatNo	Integer		Simple

Cancellation:

ColumnName	Datatype	Constraints	Type of Attributes
PNRNo	Varchar(10)	Primary Key	Single-valued
DOJ	date		Single-valued
SeatNo	Integer		Simple
ContactNo	Varchar(15)		Multi-valued
Status	Varchar(10)		Simple

Conclusion: Here we understood the concept of ER model and relational model representation from ER.