

Project Phase 3

Team 9

I) Conversion of ER model into relational schema

Converting an Entity-Relationship (ER) model into a relational database schema involves systematic steps to ensure that all entities, attributes, and relationships in the ER model are accurately represented in relational terms. Here's a structured summary of the process:

Representing Entities

Strong entities are directly translated into relations. Each simple attribute of the entity becomes a column in the relation, while the entity's primary key is designated as the primary key of the relation. If the entity has composite attributes, their constituent parts are individually represented as columns within the relation. For multi-valued attributes, a new relation is created. This relation includes two attributes: one for storing the primary key of the original strong entity and the other for the multi-valued attribute. Together, these two attributes form the primary key of the new relation.

Weak entities require special handling since they lack a complete primary key. For each weak entity, a new relation is created. This relation includes all the weak entity's simple attributes and the partial key of the weak entity. To establish a connection with the owning strong entity, the primary key of the strong entity is added to this relation as a foreign key. The combination of the weak entity's partial key and the primary key of the strong entity forms the primary key of the weak entity's relation.

Representing Relationships

For 1:N or N:1 relationships, the primary key of the entity on the "1-side" is included as a foreign key in the relation representing the "N-side." This ensures that each entity instance on the "N-side" references a corresponding entity instance on the "1-side."

For **N:M relationships**, an additional relation is created. This new relation includes foreign keys referencing the primary keys of the participating entities. These foreign keys together form the primary key of the new relation. If the relationship has attributes of its own, they are added as columns to this relation.

Tourists

<u>Tourist_Id</u>	First Name	Second Name	Id_Type	Id_No	Contact Number	House_No	Postal Code	Street	<u>Travel_Id</u>	<u>Agent_Id</u>
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Tour Guide

<u>Guide_Id</u>	First Name	Second Name	Id_Type	Id_No	Contact Number	Day	Month	Year	Gender	Rating	Cost	Serving Destination	Availability Status
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Travel Agents

<u>Agent_Id</u>	First Name	Second Name	Id_Type	Id_No	Contact Number
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Tour Packages

<u>Package Id</u>	Destination	Price	<u>Place_Id</u>	Days	Nights
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Language Spoken

<u>Agent_Id</u>	<u>Guide_Id</u>	Language spoken
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Place to visit

<u>Package Id</u>	Places Offered
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Places

<u>Place_Id</u>	Destination Name	Place Name	Cost
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Customizable Transport

<u>Transport Id</u>	Source Destination	Duration	Transportation mode	transportation price	Destination location
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Customizable Hotel

<u>Hotel_Id</u>	Hotel Name	Hotel Rating	Price Day	Price Night
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Travels together with

<u>Tourist_Id1</u>	<u>Tourist_Id2</u>	<u>Travel_Id</u>
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Assigned to

<u>Guide_Id</u>	<u>Package Id</u>
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Has Offers

<u>Offer_Id</u>	<u>Package_Id</u>	Offer Name	Description	Discount	Status
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Reviews Feedback

<u>Review_Id</u>	<u>Tourist_Id</u>	<u>Package_Id</u>	Rating	Comments	Day	Month	Year
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Bookings

<u>Booking Id</u>	<u>Place Id</u>	<u>Tourist Id</u>	Amount Paid	Amount Due	total Amount	Day	Month	Year
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Payments

<u>Payment Id</u>	<u>Booking Id</u>	Booking Type	Payment Date	Payment Amount	Payment Method
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Assistance for bookings

<u>tourist_Id</u>	<u>Agent_Id</u>
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Agent Bookings

<u>Agent_Id</u>	<u>Payment Id</u>	<u>Tourist_Id</u>	<u>Booking Id</u>
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Customizable Bookings

<u>Booking Id</u>	<u>Transport Id</u>	<u>Hotel_Id</u>	Gender	Language
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Figure 1: Initial Schema

Normalization

Changes made to schema while converting to 1NF:

we made sure that every attribute has a specific data type, and all attribute values are atomic (indivisible). There are no duplicate or repeating attributes in any table, and each table has a primary key to uniquely identify its records.

Changes made to schema while converting to 2NF:

Some tables, like Payments, Bookings, Offers, Reviews and Feedback, were split into two tables each (e.g., Payments1 and Payments2). This was necessary because certain attributes depended only on part of the original primary key, not the whole key. By creating separate tables for these attributes, we removed this partial dependency.

Tourists

Tourist_Id	First Name	Second Name	Id_Type	Id_No	Contact Number	House_No	Postat Code	Street	Travel_Id	Agent_Id
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Tour Guide

Guide_Id	First Name	Second Name	Id_Type	Id_No	Contact Number	Day	Month	Year	Gender	Rating	Cost	Serving Destination	Availability Status
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Travel Agents

Agent_Id	First Name	Second Name	Id_Type	Id_No	Contact Number
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Tour Packages

Package_Id	Destination	Price	Place_Id	Days	Nights
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Language Spoken

Agent_Id	Guide_Id	Language spoken
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Place to visit

Package_Id	Places Offered
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Places

Place_Id	Destination Name	Place Name	Cost
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Customizable Tranport

Transport Id	Source Destination	Duration	Transporta- tion mode	transporta- tion price	Destination location
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Customizable Hotel

Hotel_Id	Hotel Name	Hotel Rating	Price Day	Price Night
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Travels together with

Tourist_Id1	Tourist_Id2	Travel_Id
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Assigned to

Guide_Id	Package_Id
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Has Offers 1

Offer_Id	Package_Id
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Reviews Feedback 1

Review_Id	Tourist_Id	Package_Id
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Bookings 1

Booking Id	Place Id	Tourist Id
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Payments 1

Payment Id	Booking Id
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Assistance for bookings

tourist_Id	Agent_Id
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Agent Bookings

Agent_Id	Payment Id	Tourist_Id	Booking Id
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Customizable Bookings

Booking Id	Transport Id	Hotel_Id	Gender	Language
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Has Offers 2

Offer_Id	Offer Name	Description	Discount	Status
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Reviews Feedback 2

Review_Id	Rating	Comments	Day	Month	Year
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Bookings 2

Booking Id	Amount Paid	Amount Due	Total Amount	Day	Month	Year
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Payments 2

Payment Id	Booking Type	Payment Date	Payment Amount	Payment Method
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Figure 2: Schema After 2NF

Changes made to schema while converting to 3NF:

No changes were needed for 3NF because the tables were already designed to avoid transitive dependencies. All non-primary attributes depend directly on the primary key, so the database was already well-structured without redundancy