PROJECT-02
BUS TICKETING SYSTEM
BOTTOM-UP APPROACH

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INTRODUCTION

In this project, we have picked up a complex form of data from the Bus Ticketing database to extract pieces of information from this form and have Organized the extracted pieces of information (attributes) into a table.

We have followed these steps:

i) Normalize the resulting table following rules of normalization up to 3NF. In this process, we have made certain assumptions about some attributes or about relationships among them, which have been clearly stated in the project.
ii) Translate the tables to MySQL (SQL) code using Data Definition language. Select suitable data types.
iii) Apply proper database constraints to attributes in the coded tables.
iv) Create various users of the database. Define their roles and assign them proper authority. Translate these roles to MySQL-code using SQL Data Control language.
v) Run the code in the MySQL server to create all objects and users with proper role definitions.
vi) Use MySQL server Workbench to create an ER diagram.
vi) Finally prepared the report.

This repository contains:
a) The starting form
b) Normalized tables--step-by-step
c) An SQL file with SQL code
d) ER diagram
e) Report containing case, assumptions, etc

FIRST NORMAL FORM

According to the first normal form, there should not be any nested tables for all groups of elements. For the table to satisfy the first normal form, the group was removed by giving the sets the values for their missing attributes. Therefore, after the first normalization the following table was obtained

Primary key: Ticket ID

Ticket No.	Date	Customer ID	Customer Name	Customer ID Proof	Customer Phone	Bus No.	Start City	End City	Total Distance(Km)	Fare Per Km	Total Fare	Vehicle Make	No. of Seats	Driver Name	Driver ID
101	01-30-2022	AA100	Harish Kumar	4532	9878967232	721	Delhi	Jaipur	232	13	3016	Mercedes	36	Brijesh Singh	Z334
112	01-31-2022					721	Jaipur	Delhi	232	13	3016	Mercedes	36	Brijesh Singh	Z334
102	01-30-2022	AA101	Harvinder Pal	4534	9345678900	771	Amritsar	Haryana	201	14	2814	Volvo	40	Manoj Pal	Z322
114	01-31-2022					771	Haryana	Amritsar	201	14	2814	Volvo	40	Manoj Pal	Z322
103	01-31-2022	AA102	Kush Mehra	3265	9876512345	321	Agra	Delhi	190	11	2090	Tata	44	Kushwant Singh	Z336
209	02-07-2022					721	Delhi	Jaipur	232	13	3016	Mercedes	36	Brijesh Singh	Z334
299	02-18-2022					112	Jaipur	Moga	245	14	3430	Volvo	40	Manohar Dubey	Z337
104	02-01-2022	AA103	Akhilesh Pal	9845	8156789043	112	Jaipur	Moga	245	14	3430	Volvo	40	Manohar Dubey	Z337
199	02-02-2022					112	Moga	Jaipur	245	14	3430	Volvo	40	Manohar Dubey	Z337
105	02-01-2022	AA104	Babjeet Singh	6969	9711546789	543	Chandigarh	Delhi	286	14	4004	Volvo	40	Brijesh Singh	Z334
188	02-02-2022					654	Delhi	Amritsar	449	11	4939	Tata	44	Zoravar Singh	Z889
192	02-03-2022					654	Amritsar	Delhi	449	11	4939	Tata	44	Zoravar Singh	Z889
106	02-02-2022	AA105	Ayush Srivastava	9034	9876541234	721	Jaipur	Delhi	232	13	3016	Mercedes	36	Brijesh Singh	Z334
109	02-03-2022					721	Delhi	Jaipur	232	13	3016	Mercedes	36	Brijesh Singh	Z334
107	02-03-2022	AA106	Chiresh Deol	9696	9865498765	332	Chandigarh	Jaipur	249	11	2739	Tata	44	Kushwant Singh	Z336
285	02-05-2022					332	Jaipur	Chandigarh	249	11	2739	Tata	44	Kushwant Singh	Z336
108	02-04-2022	AA107	Tejasvi Singh	7034	9234657849	443	Jammu	Amritsar	231	11	2541	Tata	44	Manohar Dubey	Z337
165	02-07-2022					443	Amritsar	Jammu	231	11	2541	Tata	44	Manohar Dubey	Z337
176	02-05-2022	AA108	Tanvi Goel	4578	9899876654	409	Delhi	Nainital	237	14	3318	Volvo	40	Brijesh Singh	Z334
217	02-09-2022					409	Nainital	Delhi	237	14	3318	Volvo	40	Brijesh Singh	Z334
110	02-06-2022	AA109	Harpal Pandey	8823	9999988774	321	Nanital	Mussorie	198	14	2772	Volvo	40	Manoj Pal	Z322
234	02-12-2022					321	Mussorie	Nanital	198	14	2772	Volvo	40	Manoj Pal	Z322
111	02-07-2022	AA110	Yash Jain	9956	9543267877	877	Delhi	Haridwar	239	14	3346	Volvo	40	Kushwant Singh	Z336
151	02-09-2022					877	Haridwar	Delhi	239	14	3346	Volvo	40	Kushwant Singh	Z336

SECOND NORMAL FORM

The second normal form says there should be no dependencies on a part of the composite key. And if any such exists in the table, it needs to be separated along with that primary key. After applying 2 NF, the tables generated are named as,

Ticket No.	Date	Customer ID	Customer Name	Customer ID Proof	Customer Phone	Bus No.	Start City	End City	Total Distance(Km)	Fare Per Km	Total Fare	Vehicle Make	No. of Seats	Driver Name	Driver ID
101	01-30-2022	AA100	Harish Kumar	4532	9878967232	721	Delhi	Jaipur	232	13	3016	Mercedes	36	Brijesh Singh	Z334
102	01-30-2022	AA101	Harvinder Pal	4534	9345678900	771	Amritsar	Haryana	201	14	2814	Volvo	40	Manoj Pal	Z322
103	01-31-2022	AA102	Kush Mehra	3265	9876512345	321	Agra	Delhi	190	11	2090	Tata	44	Kushwant Singh	Z336
104	02-01-2022	AA103	Akhilesh Pal	9845	8156789043	112	Jaipur	Moga	245	14	3430	Volvo	40	Manohar Dubey	Z337
105	02-01-2022	AA104	Babjeet Singh	6969	9711546789	543	Chandigarh	Delhi	286	14	4004	Volvo	40	Rampal	Z334
106	02-02-2022	AA105	Ayush Srivastava	9034	9876541234	721	Jaipur	Delhi	232	13	3016	Mercedes	36	Brijesh Singh	Z334
107	02-03-2022	AA106	Chiresh Deol	9696	9865498765	332	Chandigarh	Jaipur	249	11	2739	Tata	44	Kushwant Singh	Z336
108	02-04-2022	AA107	Tejasvi Singh	7034	9234657849	443	Jammu	Amritsar	231	11	2541	Tata	44	Manohar Dubey	Z337
109	02-03-2022	AA105	Ayush Srivastava	9034	9876541234	721	Delhi	Jaipur	232	13	3016	Mercedes	36	Brijesh Singh	Z334
110	02-06-2022	AA109	Harpal Pandey	8823	9999988774	321	Nanital	Mussorie	198	14	2772	Volvo	40	Manoj Pal	Z322
111	02-07-2022	AA110	Yash Jain	9956	9543267877	877	Delhi	Haridwar	239	14	3346	Volvo	40	Kushwant Singh	Z336
112	01-31-2022	AA100	Harish Kumar	4532	9878967232	721	Jaipur	Delhi	232	13	3016	Mercedes	36	Brijesh Singh	Z334
114	01-31-2022	AA101	Harvinder Pal	4534	9345678900	771	Haryana	Amritsar	201	14	2814	Volvo	40	Manoj Pal	Z322
151	02-09-2022	AA110	Yash Jain	9956	9543267877	877	Haridwar	Delhi	239	14	2772	Volvo	40	Kushwant Singh	Z336
165	02-07-2022	AA107	Tejasvi Singh	7034	9234657849	443	Amritsar	Jammu	231	11	2541	Tata	44	Manohar Dubey	Z337
176	02-05-2022	AA108	Tanvi Goel	4578	9899876654	409	Delhi	Nainital	237	14	3318	Volvo	40	Brijesh Singh	Z334
188	02-02-2022	AA104	Babjeet Singh	6969	9711546789	654	Delhi	Amritsar	449	11	4939	Tata	44	Zoravar Singh	Z889
192	02-03-2022	AA104	Babjeet Singh	6969	9711546789	654	Amritsar	Delhi	449	11	4939	Tata	44	Zoravar Singh	Z889
199	02-02-2022	AA103	Akhilesh Pal	9845	8156789043	112	Moga	Jaipur	245	14	3430	Volvo	40	Manohar Dubey	Z337
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234	02-12-2022	AA109	Harpal Pandey	8823	9999988774	321	Mussorie	Nanital	198	14	2772	Volvo	40	Manoj Pal	Z322
285	02-05-2022	AA106	Chiresh Deol	9696	9865498765	332	Jaipur	Chandigarh	249	11	2739	Tata	44	Kushwant Singh	Z336
299	02-18-2022	AA102	Kush Mehra	3265	9876512345	112	Jaipur	Moga	245	14	3430	Volvo	40	Manohar Dubey	Z337

THIRD NORMAL FORM

The third normal form is about no dependencies on non-key attributes. And in our table, there are no dependencies on non-key attributes.

Customer
Customer ID (PK)
Customer Name
Customer ID Proof
Customer Phone

Bus Details
Bus No. (PK)
Start City
End City
Fare Per Km
No. of Seats
Vehicle Make
Driver ID
Date (PK)

Fare
Fare Per Km
Distance (Km)
Total Fare
Ticket No. (PK)

ASSUMPTIONS:

1. Ticket ID is unique.
2. Customer ID is unique.
3. ID proof is unique.
4. A particular bus no. commutes between two cities only.
5. Total Fare is calculated as per the Total Distance(Km).
6. No. of seats signify the capacity of the Bus.
7. Each Bus has a dedicated Driver with an Unique ID.

CODE

```
CREATE DATABASE BUS_TICKET ;
USE BUS_TICKET ;

DROP TABLE IF EXISTS Ticket_info;
DROP TABLE IF EXISTS Customer;
DROP TABLE IF EXISTS Fares;
DROP TABLE IF EXISTS Driver;

CREATE TABLE Ticket_info(
ticket_id VARCHAR(10) PRIMARY KEY, bus_no VARCHAR(5) NOT NULL, Start_City
VARCHAR(30), End_City VARCHAR(30), Total_Fare DECIMAL NOT NULL,Seats tinyint,
Vehicle_Make ENUM('Volvo', 'TATA', 'Mercedes'), Date_of_travel DATE NOT
NULL,Distance DECIMAL NOT NULL);

CREATE TABLE Customer(
customer_id VARCHAR(10) PRIMARY KEY, customer_name VARCHAR(50),
customer_idproof VARCHAR(40), customer_phone INT NOT NULL,ticket_id
VARCHAR(10), Date_of_travel DATE NOT NULL, FOREIGN KEY (ticket_id) REFERENCES
```

```
Ticket_info(ticket_id), CONSTRAINT Tic_id_Customer_integrity
UNIQUE(ticket_id));


CREATE TABLE Fares(
Vehicle_Make ENUM('Volvo', 'TATA', 'Mercedes'), FARE_Perkm INT NOT NULL,
Distance DECIMAL NOT NULL, Total_Fare DECIMAL NOT NULL,ticket_id VARCHAR(10)
UNIQUE PRIMARY KEY, Date_of_travel DATE NOT NULL,FOREIGN KEY (ticket_id)
REFERENCES Ticket_info (ticket_id), CONSTRAINT Tic_Customer_integrity
UNIQUE(ticket_id));


CREATE TABLE Driver(
ticket_id VARCHAR(10), d_name VARCHAR(50), d_id VARCHAR(10),bus_no VARCHAR(5)
NOT NULL,Start_City VARCHAR(30), End_City VARCHAR(30), FOREIGN KEY
(ticket_id) REFERENCES Ticket_info(ticket_id), CONSTRAINT
Tic_id_Customer_integrity UNIQUE(ticket_id));

INSERT INTO Ticket_info
VALUES('101','721','Delhi','Jaipur',3016.00,36,'Mercedes',
'2022-01-30',232.00);
INSERT INTO Ticket_info
VALUES('102','771','Amritsar','Haryana',2814.00,40,'Volvo','2022-01-30',232.0
0);
INSERT INTO Ticket_info
VALUES('103','321','Agra','Delhi',2090.00,44,'TATA','2022-01-31',232.00);
INSERT INTO Ticket_info
VALUES('104','112','Jaipur','Moga',3430.00,40,'Volvo','2022-02-01',232.00);
INSERT INTO Ticket_info
VALUES('105','543','Chandigarh','Delhi',4004.00,40,'Volvo','2022-02-02',232.0
0);


INSERT INTO Customer VALUES('AA100','Harish
Kumar','4532',999932123,'101','2022-01-30');
INSERT INTO Customer VALUES('AA102','Kush
Mehra','3265',999932997,'103','2022-01-31');
INSERT INTO Customer VALUES('AA103','Akhilesh
Pal','4534',999932124,'104','2022-02-01');
INSERT INTO Customer VALUES('AA104','Babjeet
Singh','6969',999932120,'105','2022-02-02');

INSERT INTO Fares VALUES('Mercedes', 13, 232.00, 3016.00, '101',
'2022-01-30');
INSERT INTO Fares VALUES('TATA', 13, 290.00, 2090.00, '103','2022-01-31' );
INSERT INTO Fares VALUES('Volvo', 14, 245.00, 3430.00, '104','2022-02-01');
INSERT INTO Fares VALUES('Volvo', 14, 286.00, 4004.00, '105','2022-02-02');

INSERT INTO Driver VALUES('101', 'Brijesh Singh', 'Z334', '721',
'Delhi','Jaipur');
INSERT INTO Driver VALUES('103', 'Kushwant Singh', 'Z336',
'321','Agra','Delhi');
INSERT INTO Driver VALUES('104', 'Manohar Dubey', 'Z337',
'112','Jaipur','Moga');
INSERT INTO Driver VALUES('105', 'Rampal', 'Z301',
'543','Chandigarh','Delhi');

Select * from Ticket_info;
```

```sql
Select * from Customer;
Select * from Fares;
Select * from Driver;
```