



**Big Data for Managers & Analytics**

**Topic: Database Project Report on Driving License Form**

**Submitted To**

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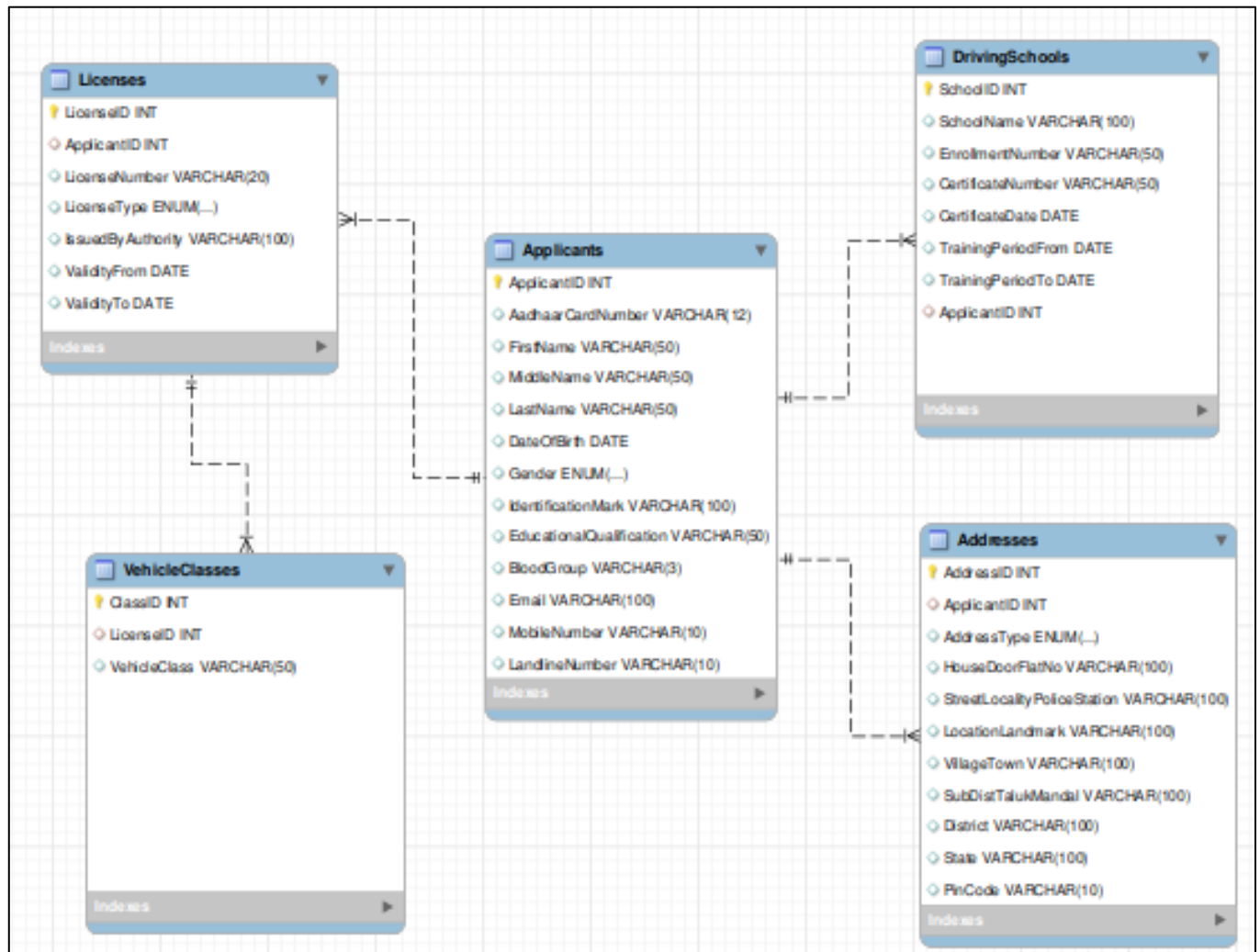
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## ERD Diagram



## Describing the Tables

```
mysql> DESCRIBE Applicants;
```

Field	Type	Null	Key	Default	Extra
ApplicantID	int	NO	PRI	NULL	auto_increment
AadhaarCardNumber	varchar(12)	YES	UNI	NULL	
FirstName	varchar(50)	YES		NULL	
MiddleName	varchar(50)	YES		NULL	
LastName	varchar(50)	YES		NULL	
DateOfBirth	date	YES		NULL	
Gender	enum('Male','Female','Transgender')	YES		NULL	
IdentificationMark	varchar(100)	YES		NULL	
EducationalQualification	varchar(50)	YES		NULL	
BloodGroup	varchar(3)	YES		NULL	
Email	varchar(100)	YES		NULL	
MobileNumber	varchar(10)	YES		NULL	
LandlineNumber	varchar(10)	YES		NULL	

```
13 rows in set (0.00 sec)
```

```
mysql> DESCRIBE Addresses;
```

Field	Type	Null	Key	Default	Extra
AddressID	int	NO	PRI	NULL	auto_increment
ApplicantID	int	YES	MUL	NULL	
AddressType	enum('Present','Permanent')	YES		NULL	
HouseDoorFlatNo	varchar(100)	YES		NULL	
StreetLocalityPoliceStation	varchar(100)	YES		NULL	
LocationLandmark	varchar(100)	YES		NULL	
VillageTown	varchar(100)	YES		NULL	
SubDistTalukMandal	varchar(100)	YES		NULL	
District	varchar(100)	YES		NULL	
State	varchar(100)	YES		NULL	
PinCode	varchar(10)	YES		NULL	

```
11 rows in set (0.00 sec)
```

```
mysql> DESCRIBE Licenses;
```

Field	Type	Null	Key	Default	Extra
LicenseID	int	NO	PRI	NULL	auto_increment
ApplicantID	int	YES	MUL	NULL	
LicenseNumber	varchar(20)	YES	UNI	NULL	
LicenseType	enum('Learner','Permanent')	YES		NULL	
IssuedByAuthority	varchar(100)	YES		NULL	
ValidityFrom	date	YES		NULL	
ValidityTo	date	YES		NULL	

```
7 rows in set (0.00 sec)
```

```
mysql> DESCRIBE VehicleClasses;
```

Field	Type	Null	Key	Default	Extra
ClassID	int	NO	PRI	NULL	auto_increment
LicenseID	int	YES	MUL	NULL	
VehicleClass	varchar(50)	YES		NULL	

```
3 rows in set (0.00 sec)
```

```
mysql> DESCRIBE DrivingSchools;
```

Field	Type	Null	Key	Default	Extra
SchoolID	int	NO	PRI	NULL	auto_increment
SchoolName	varchar(100)	YES		NULL	
EnrollmentNumber	varchar(50)	YES		NULL	
CertificateNumber	varchar(50)	YES		NULL	
CertificateDate	date	YES		NULL	
TrainingPeriodFrom	date	YES		NULL	
TrainingPeriodTo	date	YES		NULL	
ApplicantID	int	YES	MUL	NULL	

```
8 rows in set (0.00 sec)
```

## Select \* From

```
mysql> SELECT * FROM Applicants;
```

ApplicantID	AadhaarCardNumber	FirstName	MiddleName	LastName	DateOfBirth	Gender	IdentificationMark	EducationalQualification	BloodGroup	Email	MobileNumber	LandlineNumber
1	123456789012	Rahul	Kumar	Sharma	1990-05-15	Male	Mole on left cheek	Graduate	B+	rahul.sharma@example.com	9876543210	0112233440
2	987654321098	Priya	Raj	Verma	1995-07-20	Female	Scar on right hand	Postgraduate	O+	priya.verma@example.com	9123456780	0225566778

```
2 rows in set (0.00 sec)
```

```
mysql> SELECT * FROM DrivingSchools;
```

SchoolID	SchoolName	EnrollmentNumber	CertificateNumber	CertificateDate	TrainingPeriodFrom	TrainingPeriodTo	ApplicantID
1	ABC Driving School	ENR12345	CERT12345	2023-02-01	2023-01-01	2023-01-31	1
2	XYZ Driving Academy	ENR67890	CERT67890	2023-03-10	2023-02-10	2023-03-09	2

```
2 rows in set (0.00 sec)
```

```
mysql> SELECT * FROM Addresses;
```

AddressID	ApplicantID	AddressType	HouseDoorFlatNo	StreetLocalityPoliceStation	LocationLandmark
VillageTown	SubDistTalukMandal	District	State	PinCode	
1	1	Present	A-12	Sector 5, Rohini	Near Metro Station
Delhi	Rohini		North West Delhi	Delhi	110085
2	2	Permanent	B-22	Lajpat Nagar	Near Central Market
Delhi	Lajpat Nagar		South Delhi	Delhi	110024

```
2 rows in set (0.00 sec)
```

```
mysql> SELECT * FROM Licenses;
```

LicenseID	ApplicantID	LicenseNumber	LicenseType	IssuedByAuthority	ValidityFrom	ValidityTo
1	1	DL-012345678901	Permanent	Delhi RTO	2021-08-01	2031-07-31
2	2	DL-098765432109	Learner	Mumbai RTO	2023-01-15	2024-01-14

```
2 rows in set (0.00 sec)
```

```
mysql> SELECT * FROM VehicleClasses;
+-----+-----+-----+
| ClassID | LicenseID | VehicleClass |
+-----+-----+-----+
| 1 | 1 | Light Motor Vehicle |
| 2 | 2 | Motor Cycle With Gear |
+-----+-----+-----+
2 rows in set (0.00 sec)
```

### 1.1 Codes for designing a SQL schema for the tables Applicants, Driving Schools, Addresses, Licenses and Vehicle Classes

#### Create the database

**CREATE DATABASE LicenseManagementDB;**

#### Use the created database

**USE LicenseManagementDB;**

CREATE TABLE Applicants ( ApplicantID INT AUTO\_INCREMENT PRIMARY KEY, AadhaarCardNumber VARCHAR(12) UNIQUE, FirstName VARCHAR(50), MiddleName VARCHAR(50), LastName VARCHAR(50), DateOfBirth DATE, Gender ENUM('Male', 'Female', 'Transgender'), IdentificationMark VARCHAR(100), EducationalQualification VARCHAR(50), BloodGroup VARCHAR(3), Email VARCHAR(100), MobileNumber VARCHAR(15), LandlineNumber VARCHAR(15) );

CREATE TABLE Addresses ( AddressID INT AUTO\_INCREMENT PRIMARY KEY, ApplicantID INT, AddressType ENUM('Present', 'Permanent'), HouseDoorFlatNo VARCHAR(100), StreetLocalityPoliceStation VARCHAR(100), LocationLandmark VARCHAR(100), VillageTown VARCHAR(100), SubDistTalukMandal VARCHAR(100), District VARCHAR(100), State VARCHAR(100), PinCode VARCHAR(10), FOREIGN KEY (ApplicantID) REFERENCES Applicants(ApplicantID) );

CREATE TABLE Licenses ( LicenseID INT AUTO\_INCREMENT PRIMARY KEY, ApplicantID INT, LicenseNumber VARCHAR(20) UNIQUE, LicenseType ENUM('Learner', 'Permanent'), IssuedByAuthority VARCHAR(100), ValidityFrom DATE, ValidityTo DATE, FOREIGN KEY (ApplicantID) REFERENCES Applicants(ApplicantID) );

CREATE TABLE VehicleClasses ( ClassID INT AUTO\_INCREMENT PRIMARY KEY, LicenseID INT, VehicleClass VARCHAR(50), FOREIGN KEY (LicenseID) REFERENCES Licenses(LicenseID) );

CREATE TABLE DrivingSchools ( SchoolID INT AUTO\_INCREMENT PRIMARY KEY, SchoolName VARCHAR(100), EnrollmentNumber VARCHAR(50), CertificateNumber VARCHAR(50), CertificateDate DATE, TrainingPeriodFrom DATE, TrainingPeriodTo DATE, ApplicantID INT, FOREIGN KEY (ApplicantID) REFERENCES Applicants(ApplicantID) );

## **1.2 Insert Statements**

### **Insert data into Applicants table**

```
INSERT INTO Applicants (AadhaarCardNumber, FirstName, MiddleName, LastName, DateOfBirth, Gender, IdentificationMark, EducationalQualification, BloodGroup, Email, MobileNumber, LandlineNumber)
```

```
VALUES ('123456789012', 'Rahul', 'Kumar', 'Sharma', '1990-05-15', 'Male', 'Mole on left cheek', 'Graduate', 'B+', 'rahul.sharma@example.com', '9876543210', '0112233445');
```

```
INSERT INTO Applicants (AadhaarCardNumber, FirstName, MiddleName, LastName, DateOfBirth, Gender, IdentificationMark, EducationalQualification, BloodGroup, Email, MobileNumber, LandlineNumber)
```

```
VALUES ('987654321098', 'Priya', 'Raj', 'Verma', '1995-07-20', 'Female', 'Scar on right hand', 'Postgraduate', 'O+', 'priya.verma@example.com', '9123456780', '0225566778');
```

### **Insert statements for Addresses table**

```
INSERT INTO Addresses (ApplicantID, AddressType, HouseDoorFlatNo, StreetLocalityPoliceStation, LocationLandmark, VillageTown, SubDistTalukMandal, District, State, PinCode)
```

```
VALUES (1, 'Present', 'A-12', 'Sector 5, Rohini', 'Near Metro Station', 'Delhi', 'Rohini', 'North West Delhi', 'Delhi', '110085');
```

```
INSERT INTO Addresses (ApplicantID, AddressType, HouseDoorFlatNo, StreetLocalityPoliceStation, LocationLandmark, VillageTown, SubDistTalukMandal, District, State, PinCode)
```

```
VALUES (2, 'Permanent', 'B-22', 'Lajpat Nagar', 'Near Central Market', 'Delhi', 'Lajpat Nagar', 'South Delhi', 'Delhi', '110024');
```

### **Insert statements for Licenses table**

```
INSERT INTO Licenses (ApplicantID, LicenseNumber, LicenseType, IssuedByAuthority, ValidityFrom, ValidityTo)
```

```
VALUES (1, 'DL-012345678901', 'Permanent', 'Delhi RTO', '2021-08-01', '2031-07-31');
```

```
INSERT INTO Licenses (ApplicantID, LicenseNumber, LicenseType, IssuedByAuthority, ValidityFrom, ValidityTo)
```

```
VALUES (2, 'DL-098765432109', 'Learner', 'Mumbai RTO', '2023-01-15', '2024-01-14');
```

### **Insert statements for VehicleClasses table**

```
INSERT INTO VehicleClasses (LicenseID, VehicleClass)
```

```
VALUES (1, 'Light Motor Vehicle');
```

```
INSERT INTO VehicleClasses (LicenseID, VehicleClass)
```

VALUES (2, 'Motor Cycle With Gear');

#### **Insert statements for DrivingSchools table**

INSERT INTO DrivingSchools (SchoolName, EnrollmentNumber, CertificateNumber, CertificateDate, TrainingPeriodFrom, TrainingPeriodTo, ApplicantID)

VALUES ('ABC Driving School', 'ENR12345', 'CERT12345', '2023-02-01', '2023-01-01', '2023-01-31', 1);

INSERT INTO DrivingSchools (SchoolName, EnrollmentNumber, CertificateNumber, CertificateDate, TrainingPeriodFrom, TrainingPeriodTo, ApplicantID)

VALUES ('XYZ Driving Academy', 'ENR67890', 'CERT67890', '2023-03-10', '2023-02-10', '2023-03-09', 2);

### **1.3 Privilege Codes:**

#### **1. Create Users**

CREATE USER 'rajesh'@'localhost' IDENTIFIED BY 'password\_for\_rajesh';

CREATE USER 'neeta'@'localhost' IDENTIFIED BY 'password\_for\_neeta';

#### **2. Grant Privileges**

##### **For the Manager (Rajesh):**

**Assuming you want to grant Rajesh SELECT, INSERT, and UPDATE privileges:**

Grant SELECT, INSERT, and UPDATE privileges to Rajesh on all tables

GRANT SELECT, INSERT, UPDATE ON Applicants TO 'rajesh'@'localhost';

GRANT SELECT, INSERT, UPDATE ON Addresses TO 'rajesh'@'localhost';

GRANT SELECT, INSERT, UPDATE ON Licenses TO 'rajesh'@'localhost';

GRANT SELECT, INSERT, UPDATE ON VehicleClasses TO 'rajesh'@'localhost';

GRANT SELECT, INSERT, UPDATE ON DrivingSchools TO 'rajesh'@'localhost';

##### **For the Employees (Neeta):**

(Grant read-only access to Neeta)

Grant SELECT (read-only) access to Neeta on all tables

GRANT SELECT ON Applicants TO 'neeta'@'localhost';

GRANT SELECT ON Addresses TO 'neeta'@'localhost';

GRANT SELECT ON Licenses TO 'neeta'@'localhost';

GRANT SELECT ON VehicleClasses TO 'neeta'@'localhost';

GRANT SELECT ON DrivingSchools TO 'neeta'@'localhost';

## **Normalization process**

### **1. First Normal Form (1NF)**

Criteria for 1NF:

- Each table has a unique identifier (primary key).
- Each column contains atomic values (no lists or sets of values).
- Each column contains a single type of data (no mixed data types in a single column).

In this set of tables:

- Applicants Table: Each applicant has a unique ApplicantID. All columns contain atomic values, like names, dates, and contact information.
- Addresses Table: Each address is associated with an ApplicantID, and each column (e.g., street, locality, etc.) contains only one value.
- Licenses Table: Each license has a unique LicenseID, and all the information in this table (like license number, type, and validity dates) is stored in atomic columns.
- VehicleClasses Table: Each vehicle class is stored with a unique ClassID, and the VehicleClass field holds only one class per record.
- DrivingSchools Table: Each driving school entry is identified by SchoolID, and all other data (like the school name, enrollment number, etc.) is atomic.

### **2. Second Normal Form (2NF)**

Criteria for 2NF:

- It must satisfy 1NF.
- Every non-key attribute must depend on the entire primary key (i.e., no partial dependency).

Since all tables have a single-column primary key (e.g., ApplicantID, LicenseID), there are no partial dependencies in this case. Every non-key attribute is fully dependent on the primary key in each table.

Examples:

- In the Applicants Table, all attributes like FirstName, Email, etc., depend entirely on ApplicantID.
- In the Licenses Table, LicenseNumber, IssuedByAuthority, etc., depend on LicenseID, which uniquely identifies each license.
- The VehicleClasses Table associates each vehicle class with a LicenseID, ensuring that the vehicle class only depends on the license to which it's linked.

### **3. Third Normal Form (3NF)**

Criteria for 3NF:

- It must satisfy 2NF.



- There should be no transitive dependencies, i.e., non-key attributes must not depend on other non-key attributes.

In this design:

- Applicants Table: There is no transitive dependency, as every non-key attribute directly relates to ApplicantID.
- Addresses Table: No transitive dependency exists because each address attribute (like VillageTown, District) directly depends on AddressID.
- Licenses Table: Every non-key attribute (like LicenseNumber, LicenseType) depends directly on the LicenseID.
- DrivingSchools Table: Attributes like SchoolName, EnrollmentNumber depend directly on SchoolID, and there's no dependency between non-key fields.

### **Normalization Applied to Each Table:**

#### **1. Applicants Table:**

- 1NF: The table has atomic columns (like FirstName, Email, etc.), and ApplicantID is the primary key.
- 2NF: All attributes are fully dependent on ApplicantID (there's no partial dependency).
- 3NF: There are no transitive dependencies (non-key fields don't depend on other non-key fields).

#### **2. Addresses Table:**

- 1NF: Atomic columns such as Street, VillageTown, State, etc., and each address is uniquely identified by AddressID.
- 2NF: All attributes depend on the combination of ApplicantID and AddressType.
- 3NF: All columns depend directly on the AddressID, with no transitive dependencies.

#### **3. Licenses Table:**

- 1NF: Atomic columns for license data such as LicenseNumber, IssuedByAuthority, ValidityFrom, etc.
- 2NF: All license attributes depend on LicenseID.
- 3NF: There are no transitive dependencies (i.e., LicenseType doesn't depend on IssuedByAuthority or other fields).

#### **4. VehicleClasses Table:**

- 1NF: Contains atomic values like VehicleClass.
- 2NF: Fully dependent on the LicenseID (each class is linked to a specific license).
- 3NF: No transitive dependencies are present.

#### **5. DrivingSchools Table:**

- 1NF: Atomic values for driving school data such as SchoolName, EnrollmentNumber, CertificateNumber.
- 2NF: All attributes are fully dependent on SchoolID.
- 3NF: There are no transitive dependencies in this table.