National Institute of Technology Warangal

Department of Computer Science and Engineering

B.Tech 2nd Year (CSE)

Criminal Management Database System

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Contents

DBMS Project Problem Statement

This project aims to design a **Crime Record Management Database** to assist law enforcement agencies in efficiently managing criminal investigations. The system will track **FIRs, officers involved, accused criminals, victims, evidence**, and **witnesses** for each case. It ensures accurate documentation, real-time retrieval of case histories, and secure access to critical data.

The database will help police departments:

- Retrieve records of repeat offenders.
- Assign officers to cases and track their progress.
- Store and relate evidence to corresponding cases.
- Maintain transparency and accountability across multiple investigations.

ER Model Assumptions

1. **Victim–FIR**
    - A **Victim** can file multiple **FIRs**, but each **FIR** is filed by exactly one **Victim**.
    - **Relationship**: 1:M from Victim to FIR
    - **Participation**: Total participation of **FIR** in this relationship
2. **FIR–Case**
    - Each **FIR** initiates exactly one **Case**, and each **Case** is linked to one **FIR**.
    - **Relationship**: 1:1
    - **Participation**: Total participation on both **FIR** and **Case**
3. **Case–Officer**
    - A **Case** can have multiple **Officers** assigned, and an **Officer** can be involved in multiple **Cases**.
    - **Relationship**: M:N via Case_Officer table
    - **Participation**: Partial (not all officers are assigned cases)

4. **Case–Criminal**

    - A **Criminal** may be involved in multiple **Cases**, and each **Case** may involve multiple **Criminals**.
    - **Relationship**: M:N via Case_Criminal table
    - **Attributes**: Relationship includes Charges
    - **Participation**: Partial (not all criminals are involved in cases)

5. **Case–Evidence**

    - Each **Case** can have multiple pieces of **Evidence**, but each **Evidence** belongs to only one **Case**.
    - **Relationship**: 1:M from Case to Evidence
    - **Participation**: Total participation of **Evidence**

6. **Case–Witness**

    - A **Case** can have multiple **Witnesses**, and a **Witness** can testify in multiple **Cases**.
    - **Relationship**: M:N via Case_Witness table
    - **Participation**: Partial on both sides

7. **Criminal–Biometric**
    - A **Criminal** can have multiple **Biometric** records (e.g., fingerprint, DNA, face scan).
    - **Each Biometric record belongs to one Criminal only**.
    - **Relationship**: 1:M from Criminal to Biometric
    - **Participation**: Total participation of **Biometric**
8. **Criminal–Alias**
    - A **Criminal** may be known by multiple **Aliases**.
    - **Each Alias** is associated with only one **Criminal**.
    - **Relationship**: 1:M from Criminal to Alias
    - **Participation**: Total participation of **Alias**
9. **Case–Legal_Proceeding**
    - A **Case** can undergo multiple **Legal Proceedings** (e.g., hearings, trials).
    - Each **Legal Proceeding** belongs to only one **Case**.
    - **Relationship**: 1:M from Case to Legal_Proceeding
    - **Participation**: Total participation of **Legal_Proceeding**

10. **Legal_Proceeding–Court**

- Each **Legal Proceeding** is held in exactly one **Court**, but a **Court** may handle many **Legal Proceedings**.

- **Relationship**: M:1 from Legal_Proceeding to Court

- **Participation**: Total participation of **Legal_Proceeding**

11. **Officer**

- Each **Officer** has a unique ID, a rank, department, and join date.

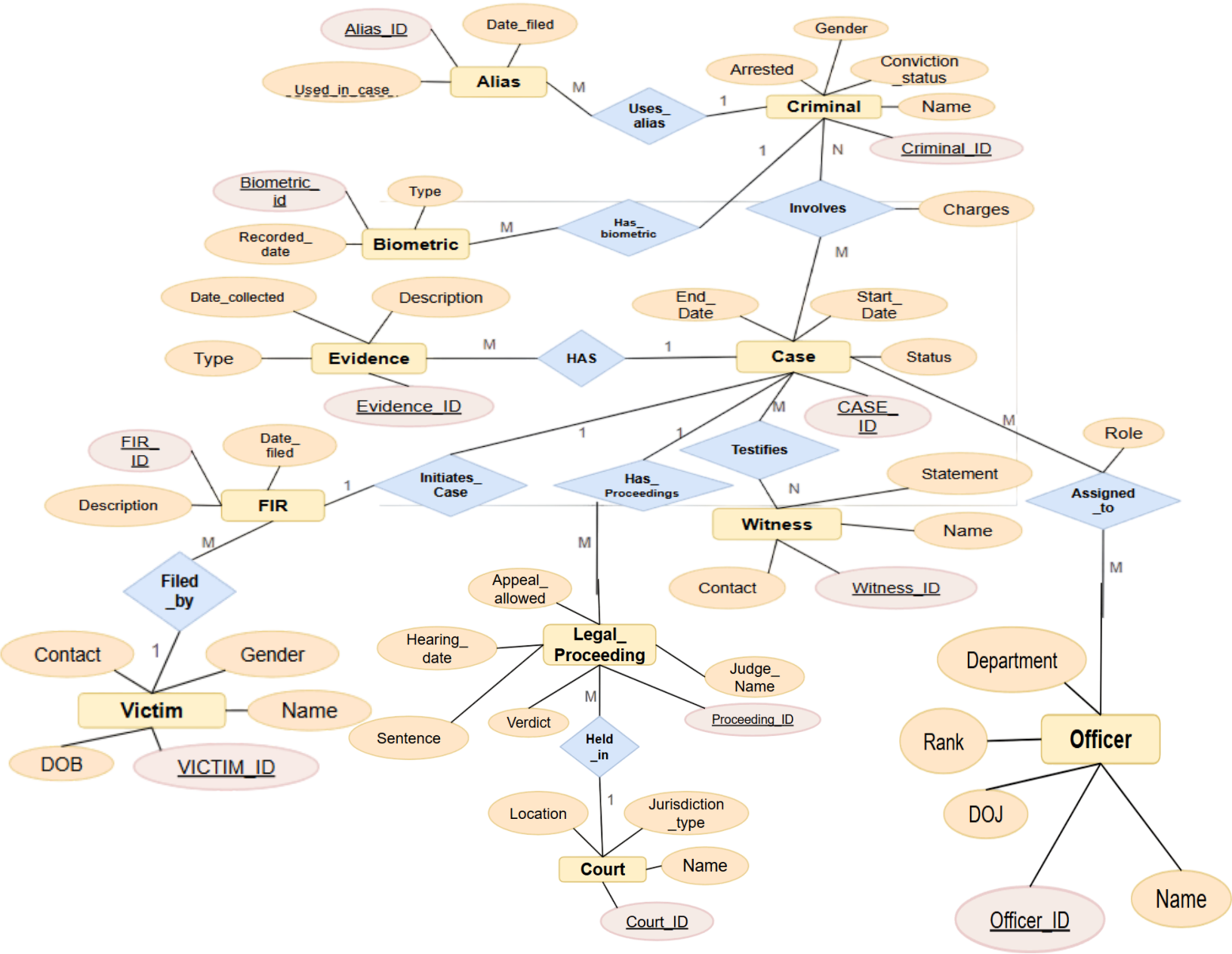
- Not every officer is necessarily assigned to a case (partial participation in Case_Officer).

12. **Criminal**

- Each **Criminal** has a profile that includes name, gender, date of birth, conviction status, and arrest status.

- A criminal may or may not have aliases or biometrics recorded (partial on those sides).

ER Diagram


Alias_ID
Date_filed
Alias
_Used_in_case_
M
Uses_ alias
1
Criminal
Gender
Arrested
Conviction _status
Name
Criminal_ID
1
N
Biometric_ id
Type
Recorded_ date
Biometric
M
Has_ biometric
Involves
Charges
M
Date_collected
Description
Type
Evidence
M
HAS
1
Case
End_ Date
Start_ Date
Status
Evidence_ID
1
1
M
CASE_ ID
M
FIR_ ID
Date_ filed
Description
FIR
1
Initiates_ Case
Has_ Proceedings
Testifies
N
Statement
Witness
Name
Contact
Witness_ID
Role
Assigned _to
M
M
Filed _by
M
Appeal_ allowed
Legal_ Proceeding
Hearing_ date
Judge_ Name
Proceeding_ID
M
Verdict
Held _in
Sentence
Contact
1
Gender
Victim
Name
DOB
VICTIM_ID
1
Location
Jurisdiction _type
Court
Name
Court_ID
Department
Rank
Officer
DOJ
Officer_ID
Name

Relational Schema

Victim		
Attribute	Data Type	Constraints
Victim_ID	Varchar(10)	Primary Key
Name	Varchar(40)	NOT NULL
DOB	Date	NOT NULL
Gender	Varchar(10)	NOT NULL
Contact	decimal(11,0)	NOT NULL

FIR		
Attribute	Data Type	Constraints
FIR_ID	Varchar(10)	Primary Key
Description	Varchar(255)	NOT NULL
Date_filed	Date	NOT NULL
Victim_ID	Varchar(10)	Foreign key,NOT NULL

Case		
Attribute	Data Type	Constraints
Case_ID	Varchar(10)	Primary Key
Status	Varchar(20)	NOT NULL
Start_Date	Date	NOT NULL
End_Date	Date	-
FIR_ID	Varchar(10)	Foreign key,NOT NULL

Evidence		
Attribute	Data Type	Constraints
Evidence_ID	Varchar(10)	Primary Key
Case_ID	Varchar(10)	Foreign key,NOT NULL
Type	Varchar(30)	NOT NULL
Description	Varchar(225)	NOT NULL
Date_collected	Date	NOT NULL

Criminal		
Attribute	Data Type	Constraints
Criminal_ID	Varchar(10)	Primary Key
Name	Varchar(40)	NOT NULL
DOB	Date	NOT NULL
Gender	Varchar(10)	NOT NULL
Conviction_status	Varchar(20)	NOT NULL
Arrested	Varchar(5)	NOT NULL

Case_Criminal		
Attribute	Data Type	Constraints
Case_ID	Varchar(10)	Primary Key(1),foreign key
Criminal_ID	Varchar(10)	Primary Key(2),foreign key
Charges	Varchar(50)	NOT NULL

Biometric		
Attribute	Data Type	Constraints
Biometric_ID	Varchar(10)	Primary Key
Criminal_ID	Varchar(10)	Foreign key,NOT NULL
Type	Varchar(50)	NOT NULL
Recorded_date	Date	NOT NULL

Alias		
Attribute	Data Type	Constraints
Alia_ID	Varchar(10)	Primary Key
Criminal_ID	Varchar(10)	Foreign key,NOT NULL
Used_in_case	Varchar(10)	Foreign key
Alias_name	Varchar(50)	NOT NULL

Witness		
Attribute	Data Type	Constraints
Witness_ID	Varchar(10)	Primary Key
Name	Varchar(40)	NOT NULL
Statement	Varchar(200)	NOT NULL
Contact	decimal(11,0)	NOT NULL

Case_Witness		
Attribute	Data Type	Constraints
Witness_ID	Varchar(10)	Primary Key(1),Foreign Key
Case_ID	Varchar(10)	Primary Key(2),Foreign Key

Officer		
Attribute	Data Type	Constraints
Officer_ID	Varchar(10)	Primary Key
Name	Varchar(40)	NOT NULL
DOJ	Date	NOT NULL
Rank	Varchar(20)	NOT NULL
Department	Varchar(20)	NOT NULL

Case_Officer		
Attribute	Data Type	Constraints
Officer_ID	Varchar(10)	Primary Key(1),Foreign Key
Case_ID	Varchar(10)	Primary Key(2),Foreign Key
Role	Varchar(20)	NOT NULL

Court		
Attribute	Data Type	Constraints
Court_ID	Varchar(20)	Primary Key(1),Foreign Key
Name	Varchar(50)	NOT NULL
Location	Varchar(50)	NOT NULL
Jurisdiction_type	Varchar(50)	NOT NULL

Criminal		
Attribute	Data Type	Constraints
Proceeding_ID	Varchar(20)	Primary Key
Case_ID	Varchar(10)	Foreign key
Court_ID	Varchar(20)	Foreign key
Hearing_date	date	NOT NULL
Judge_name	Varchar(50)	NOT NULL
Verdict	Varchar(225)	NOT NULL
Sentence	Varchar(225)	NOT NULL
Appeal_allowed	Varchar(100)	NOT NULL

Functional Dependencies

1. Victim
   - Victim_ID → Name, DOB, Gender, Contact
   - Victim_ID is the primary key.

2. FIR
   - FIR_ID → Date_filed, Description, Victim_ID
   - FIR_ID is the primary key and determines all other attributes.

3. Case
   - Case_ID → FIR_ID, Status, Start_date, End_date
   - One case = one FIR. Case_ID fully determines the case details.

4. Officer
   - Officer_ID → Name, DOJ, Rank, Department
   - Officer_ID uniquely identifies the officer.

5. Case_Officer (M:N Relationship)
   - (Case_ID, Officer_ID) → Role
   - Composite key determines the role of the officer in that case.

6. Criminal
   - Criminal_ID → Name, DOB, Gender, Conviction_Status, Arrested
   - Criminal_ID fully defines the criminal's profile.

7. Case_Criminal (M:N Relationship)
   - (Case_ID, Criminal_ID) → Charges
   - Composite key determines what the criminal was charged with in a particular case.

8. Evidence
   - Evidence_ID → Case_ID, Type, Description, Date_collected
   - Each piece of evidence is uniquely identified by Evidence_ID.

9. Witness
   - Witness_ID → Name, Statement, Contact
   - Witness_ID uniquely defines a witness and their testimony.

10. Case_Witness (M:N Relationship)
   - (Case_ID, Witness_ID) is the composite key.
   - No additional attributes, key alone suffices.

11. Biometric
   - Biometric_ID → Criminal_ID, Type, Recorded_Date
   - Each biometric record is uniquely identified and belongs to a single criminal.

12. Alias
   - Alias_ID → Criminal_ID, Alias_Name, Used_in_case
   - Alias is uniquely identified and can optionally be case-linked.

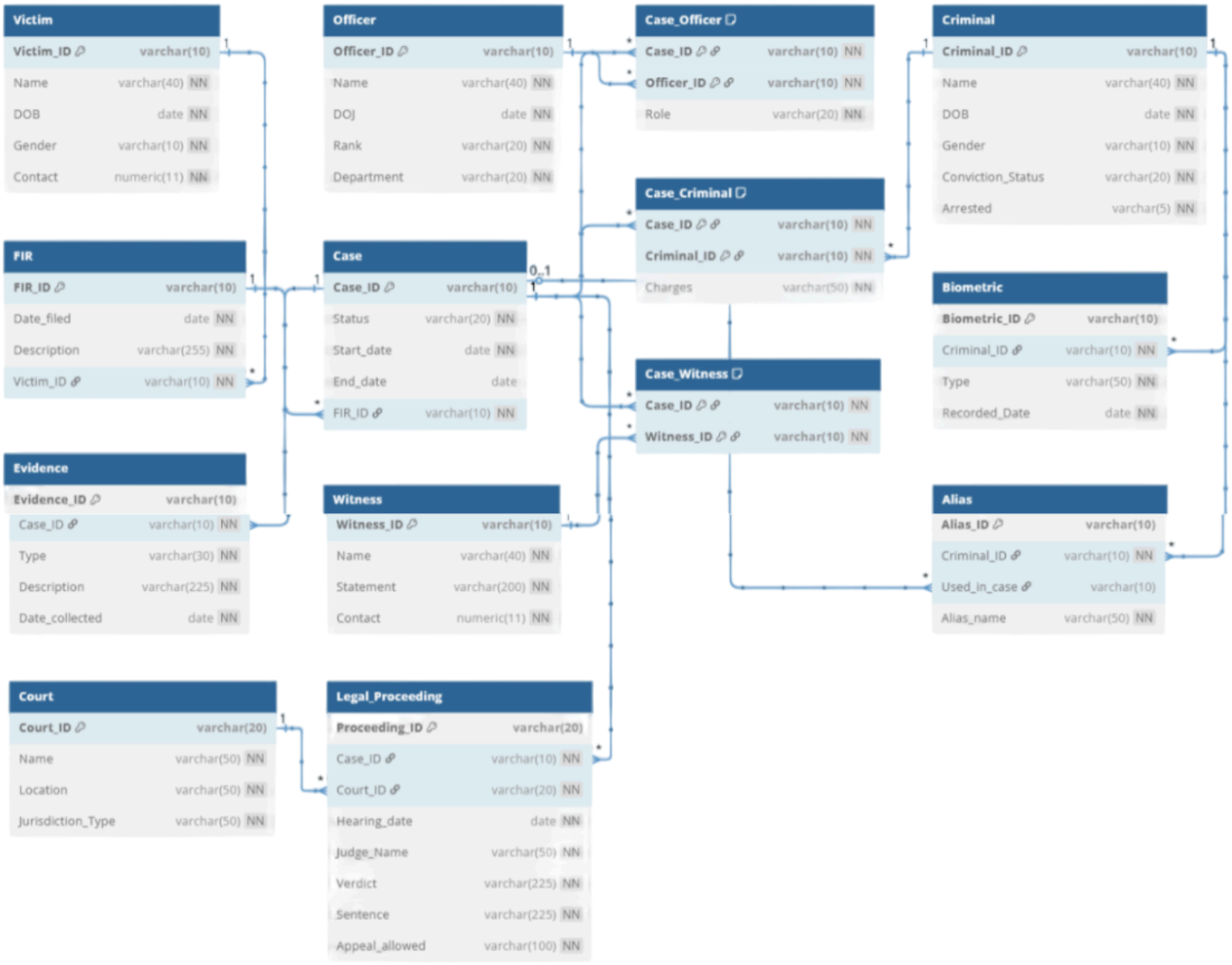
13. Court
   - Court_ID → Name, Location, Jurisdiction_Type
   - Court details are fully determined by Court_ID.

14. Legal_Proceeding

- Proceeding_ID → Case_ID, Court_ID, Hearing_date, Judge_Name, Verdict, Sentence, Appeal_allowed

- Each proceeding is uniquely identified and fully determines the legal outcome details.

Relational Model



SQL Code

Table Creation:

```
CREATE TABLE Victim (
  Victim_ID VARCHAR(10) PRIMARY KEY,
  Name VARCHAR(40) NOT NULL,
  DOB DATE NOT NULL,
  Gender VARCHAR(10) NOT NULL,
  Contact NUMERIC(11) NOT NULL
);
CREATE TABLE FIR (
  FIR_ID VARCHAR(10) PRIMARY KEY,
  Date_filed DATE NOT NULL,
  Description VARCHAR(255) NOT NULL,
  Victim_ID VARCHAR(10) NOT NULL,
  FOREIGN KEY (Victim_ID) REFERENCES Victim(Victim_ID)
);
CREATE TABLE `Case` (
  Case_ID VARCHAR(10) PRIMARY KEY,
  Status VARCHAR(20) NOT NULL,
  Start_date DATE NOT NULL,
  End_date DATE,
  FIR_ID VARCHAR(10) NOT NULL,
  FOREIGN KEY (FIR_ID) REFERENCES FIR(FIR_ID)
);
CREATE TABLE Officer (
  Officer_ID VARCHAR(10) PRIMARY KEY,
  Name VARCHAR(40) NOT NULL,
  DOJ DATE NOT NULL,
  `Rank` VARCHAR(20) NOT NULL,
  Department VARCHAR(20) NOT NULL
);
```

```sql
CREATE TABLE Case_Officer (
  Case_ID VARCHAR(10),
  Officer_ID VARCHAR(10),
  `Role` VARCHAR(20) NOT NULL,
  PRIMARY KEY (Case_ID, Officer_ID),
  FOREIGN KEY (Case_ID) REFERENCES `Case`(Case_ID),
  FOREIGN KEY (Officer_ID) REFERENCES Officer(Officer_ID)
);

CREATE TABLE Criminal (
  Criminal_ID VARCHAR(10) PRIMARY KEY,
  Name VARCHAR(40) NOT NULL,
  DOB DATE NOT NULL,
  Gender VARCHAR(10) NOT NULL,
  Conviction_Status VARCHAR(20) NOT NULL,
  Arrested VARCHAR(5) NOT NULL
);
CREATE TABLE Case_Criminal (
  Case_ID VARCHAR(10),
  Criminal_ID VARCHAR(10),
  `Charges` VARCHAR(50) NOT NULL,
  PRIMARY KEY (Case_ID, Criminal_ID),
  FOREIGN KEY (Case_ID) REFERENCES `Case`(Case_ID),
  FOREIGN KEY (Criminal_ID) REFERENCES Criminal(Criminal_ID)
);
CREATE TABLE Evidence (
  Evidence_ID VARCHAR(10) PRIMARY KEY,
  Case_ID VARCHAR(10) NOT NULL,
  `Type` VARCHAR(30) NOT NULL,
  Description VARCHAR(225) NOT NULL,
  Date_collected DATE NOT NULL,
  FOREIGN KEY (Case_ID) REFERENCES `Case`(Case_ID)
);
CREATE TABLE Witness (
  Witness_ID VARCHAR(10) PRIMARY KEY,
  `Name` VARCHAR(40) NOT NULL,
  Statement VARCHAR(200) NOT NULL,
  Contact NUMERIC(11) NOT NULL
);
```

```sql
CREATE TABLE Case_Witness (
  Case_ID VARCHAR(10),
  Witness_ID VARCHAR(10),
  PRIMARY KEY (Case_ID, Witness_ID),
  FOREIGN KEY (Case_ID) REFERENCES `Case`(Case_ID),
  FOREIGN KEY (Witness_ID) REFERENCES Witness(Witness_ID)
);
CREATE TABLE Biometric (
  Biometric_ID VARCHAR(10) PRIMARY KEY,
  Criminal_ID VARCHAR(10) NOT NULL,
  `Type` VARCHAR(50) NOT NULL,
  Recorded_Date DATE NOT NULL,
  FOREIGN KEY (Criminal_ID) REFERENCES Criminal(Criminal_ID)
);
CREATE TABLE Alias (
  Alias_ID VARCHAR(10) PRIMARY KEY,
  Criminal_ID VARCHAR(10) NOT NULL,
  Used_in_case VARCHAR(10),
  Alias_name VARCHAR(50) NOT NULL,
  FOREIGN KEY (Used_in_case) REFERENCES `Case`(Case_ID),
  FOREIGN KEY (Criminal_ID) REFERENCES Criminal(Criminal_ID)
);
CREATE TABLE Court (
  Court_ID VARCHAR(20) PRIMARY KEY,
  `Name` VARCHAR(50) NOT NULL,
  Location VARCHAR(50) NOT NULL,
  Jurisdiction_Type VARCHAR(50) NOT NULL
);
CREATE TABLE Legal_Proceeding (
  Proceeding_ID VARCHAR(20) PRIMARY KEY,
  Case_ID VARCHAR(10) NOT NULL,
  Court_ID VARCHAR(20) NOT NULL,
  Hearing_date DATE NOT NULL,
  Judge_Name VARCHAR(50) NOT NULL,
  Verdict VARCHAR(225) NOT NULL,
  Sentence VARCHAR(225) NOT NULL,
  Appeal_allowed VARCHAR(100) NOT NULL,
  FOREIGN KEY (Case_ID) REFERENCES `Case`(Case_ID),
  FOREIGN KEY (Court_ID) REFERENCES Court(Court_ID)
);
```

Insert Values:

```sql
-- Victims
INSERT INTO Victim VALUES
('V001', 'Amit Sharma', '1985-06-10', 'Male', 9876543210),
('V002', 'Neha Verma', '1990-04-22', 'Female', 9123456789),
('V003', 'Sonal Gupta', '1988-09-14', 'Female', 9988771234),
('V004', 'Aarav Singh', '1975-03-25', 'Male', 9834567890),
('V005', 'Kavita Joshi', '1995-12-01', 'Female', 9112233445);

-- FIRs
INSERT INTO FIR VALUES
('FIR001', '2024-01-15', 'Burglary reported in Sector 21', 'V001'),
('FIR002', '2024-02-01', 'Assault complaint in Green Park', 'V002'),
('FIR003', '2024-03-10', 'Cybercrime - identity theft', 'V003'),
('FIR004', '2024-03-15', 'Robbery at a jewelry store', 'V004'),
('FIR005', '2024-03-20', 'Illegal arms possession', 'V005');

-- Cases
INSERT INTO `Case` VALUES
('C001', 'Under Investigation', '2024-01-16', NULL, 'FIR001'),
('C002', 'Closed', '2024-02-02', '2024-03-15', 'FIR002'),
('C003', 'Under Investigation', '2024-03-11', NULL, 'FIR003'),
('C004', 'Under Investigation', '2024-03-16', NULL, 'FIR004'),
('C005', 'Closed', '2024-03-21', '2024-04-10', 'FIR005');

-- Officers
INSERT INTO Officer VALUES
('O001', 'Rajeev Kumar', '2020-07-01', 'Inspector', 'Delhi Central'),
('O002', 'Sunita Mehra', '2019-04-15', 'Sub-Inspector', 'Delhi South'),
('O003', 'Anjali Rana', '2018-10-10', 'Inspector', 'Delhi North'),
('O004', 'Vikram Desai', '2017-06-30', 'Sub-Inspector', 'Delhi West');

-- Case-Officer
INSERT INTO Case_Officer VALUES
('C001', 'O001', 'Lead'),
('C002', 'O002', 'Investigator'),
('C003', 'O003', 'Lead'),
('C003', 'O004', 'Investigator'),
('C004', 'O003', 'Investigator');
```

```sql
-- Criminals
INSERT INTO Criminal VALUES
('CR001', 'Ravi Thakur', '1991-03-05', 'Male', 'Convicted', 'Yes'),
('CR002', 'Shyam Lal', '1980-11-20', 'Male', 'Under Trial', 'No'),
('CR003', 'Manoj Jha', '1982-07-19', 'Male', 'Convicted', 'Yes'),
('CR004', 'Sameer Ali', '1990-02-11', 'Male', 'Under Trial', 'Yes'),
('CR005', 'Pooja Yadav', '1985-01-30', 'Female', 'Acquitted', 'No');

-- Case-Criminal
INSERT INTO Case_Criminal VALUES
('C001', 'CR001', 'Theft'),
('C002', 'CR002', 'Assault'),
('C003', 'CR003', 'Identity Theft'),
('C004', 'CR004', 'Robbery'),
('C005', 'CR005', 'Possession of Illegal Arms');

-- Evidence
INSERT INTO Evidence VALUES
('E001', 'C001', 'Weapon', 'Stolen knife found at scene', '2024-01-17'),
('E002', 'C002', 'Clothing', 'Blood-stained shirt', '2024-02-03'),
('E003', 'C003', 'Digital', 'Hard drive with stolen data', '2024-03-12'),
('E004', 'C004', 'Weapon', 'Gun recovered from suspect', '2024-03-17'),
('E005', 'C005', 'Document', 'Fake arms license', '2024-03-22');

-- Witnesses
INSERT INTO Witness VALUES
('W001', 'Ramesh Chand', 'Saw the suspect fleeing', 9988776655),
('W002', 'Anita Rani', 'Heard shouting during assault', 9876567890),
('W003', 'Mohit Sinha', 'Spotted suspicious activity', 9876543200),
('W004', 'Priya Nair', 'Gave statement about suspect's car', 9856741233),
('W005', 'Deepak Rao', 'Former accomplice testimony', 9811122233);

-- Case-Witness
INSERT INTO Case_Witness VALUES
('C001', 'W001'),
('C002', 'W002'),
('C003', 'W003'),
('C004', 'W004'),
('C005', 'W005');
```

```sql
-- Biometrics
INSERT INTO Biometric VALUES
('B001', 'CR001', 'Fingerprint', '2024-01-18'),
('B002', 'CR002', 'DNA', '2024-02-04'),
('B003', 'CR003', 'Voice Sample', '2024-03-13'),
('B004', 'CR004', 'Face Recognition', '2024-03-18');

-- Alias
INSERT INTO Alias VALUES
('A001', 'CR001', 'C001', 'Raja'),
('A002', 'CR002', 'C002', 'Lala'),
('A003', 'CR003', 'C003', 'MJ');

-- Courts
INSERT INTO Court VALUES
('CT001', 'Delhi District Court', 'New Delhi', 'District'),
('CT002', 'Tis Hazari Court', 'Delhi', 'Sessions'),
('CT003', 'Patiala House Court', 'New Delhi', 'District');

-- Legal Proceedings
INSERT INTO Legal_Proceeding VALUES
('LP001', 'C001', 'CT001', '2024-01-25', 'Justice Mehta', 'Guilty', '2
years imprisonment', 'No'),
('LP002', 'C002', 'CT002', '2024-03-01', 'Justice Kapoor', 'Pending',
'N/A', 'Yes'),
('LP003', 'C003', 'CT003', '2024-03-25', 'Justice Batra', 'Guilty', '3
years imprisonment', 'No'),
('LP004', 'C004', 'CT001', '2024-03-28', 'Justice Mehra', 'Pending',
'N/A', 'Yes'),
('LP005', 'C005', 'CT002', '2024-04-05', 'Justice Arora', 'Not Guilty',
'Acquitted', 'No');
```

Tables:

1) Victim

Victim_ID	Name	DOB	Gender	Contact
V001	Amit Sharma	1985-06-10	Male	9876543210
V002	Neha Verma	1990-04-22	Female	9123456789
V003	Sonal Gupta	1988-09-14	Female	9988771234
V004	Aarav Singh	1975-03-25	Male	9834567890
V005	Kavita Joshi	1995-12-01	Female	9112233445

2) FIR

FIR_ID	Date_filed	Description	Victim_ID
FIR001	2024-01-15	Burglary reported in Sector 21	V001
FIR002	2024-02-01	Assault complaint in Green Park	V002
FIR003	2024-03-10	Cybercrime - identity theft	V003
FIR004	2024-03-15	Robbery at a jewelry store	V004
FIR005	2024-03-20	Illegal arms possession	V005

3) Case

Case_ID	Status	Start_date	End_date	FIR_ID
C001	Under Investigation	2024-01-16	NULL	FIR001
C002	Closed	2024-02-02	2024-03-15	FIR002
C003	Under Investigation	2024-03-11	NULL	FIR003
C004	Under Investigation	2024-03-16	NULL	FIR004
C005	Closed	2024-03-21	2024-04-10	FIR005

4) Officer

Officer_ID	Name	DOJ	Rank	Department
O001	Rajeev Kumar	2020-07-01	Inspector	Delhi Central
O002	Sunita Mehra	2019-04-15	Sub-Inspector	Delhi South
O003	Anjali Rana	2018-10-10	Inspector	Delhi North
O004	Vikram Desai	2017-06-30	Sub-Inspector	Delhi West

5) Case_Officer

Case_ID	Officer_ID	Role
C001	O001	Lead
C002	O002	Investigator
C003	O003	Lead
C003	O004	Investigator
C004	O003	Investigator

6) Evidence

Evidence_ID	Case_ID	Type	Description	Date_collected
E001	C001	Weapon	Stolen knife found at scene	2024-01-17
E002	C002	Clothing	Blood-stained shirt	2024-02-03
E003	C003	Digital	Hard drive with stolen data	2024-03-12
E004	C004	Weapon	Gun recovered from suspect	2024-03-17
E005	C005	Document	Fake arms license	2024-03-22

7) Witness

Witness_ID	Name	Statement	Contact
W001	Ramesh Chand	Saw the suspect fleeing	9988776655
W002	Anita Rani	Heard shouting during assault	9876567890
W003	Mohit Sinha	Spotted suspicious activity	9876543200
W004	Priya Nair	Gave statement about suspect's car	9856741233
W005	Deepak Rao	Former accomplice testimony	9811122233

8) Case_Witness

Case_ID	Witness_ID
C001	W001
C002	W002
C003	W003
C004	W004
C005	W005

9) Criminal

Criminal_ID	Name	DOB	Gender	Conviction_Status	Arrested
CR001	Ravi Thakur	1991-03-05	Male	Convicted	Yes
CR002	Shyam Lal	1980-11-20	Male	Under Trial	No
CR003	Manoj Jha	1982-07-19	Male	Convicted	Yes
CR004	Sameer Ali	1990-02-11	Male	Under Trial	Yes
CR005	Pooja Yadav	1985-01-30	Female	Acquitted	No

10) Case_Criminal

Case_ID	Criminal_ID	Charges
C001	CR001	Theft
C002	CR002	Assault
C003	CR003	Identity Theft
C004	CR004	Robbery
C005	CR005	Possession of Illegal Arms

11) Biometric

Biometric_ID	Criminal_ID	Type	Recorded_Date
B001	CR001	Fingerprint	2024-01-18
B002	CR002	DNA	2024-02-04
B003	CR003	Voice Sample	2024-03-13
B004	CR004	Face Recognition	2024-03-18

12) Alias

Alias_ID	Criminal_ID	Used_in_case	Alias_name
A001	CR001	C001	Raja
A002	CR002	C002	Lala
A003	CR003	C003	MJ

13) Legal_Proceeding

Proceeding_ID	Case_ID	Court_ID	Hearing_date	Judge_Name	Verdict
LP001	C001	CT001	2024-01-25	Justice Mehta	Guilty
LP002	C002	CT002	2024-03-01	Justice Kapoor	Pending
LP003	C003	CT003	2024-03-25	Justice Batra	Guilty
LP004	C004	CT001	2024-03-28	Justice Mehra	Pending
LP005	C005	CT002	2024-04-05	Justice Arora	Not Guilty

14) Court

Court_ID	Name	Location	Jurisdiction_Type
CT001	Delhi District Court	New Delhi	District
CT002	Tis Hazari Court	Delhi	Sessions
CT003	Patiala House Court	New Delhi	District

Normalization

What is Normalization?

Normalization is the process of organizing data in a database to reduce data redundancy and improve data integrity. It involves decomposing complex tables into simpler ones without losing information. The goal is to ensure that each table has a clear and unambiguous structure, with each non-key attribute depending only on the primary key.

All tables in the Crime Record Management System were reviewed and confirmed to meet the standards of:

- **Third Normal Form (3NF)**
- **Boyce-Codd Normal Form (BCNF)**

There are no partial dependencies (where a non-key attribute depends only on part of a composite key), and no transitive dependencies (where a non-key attribute depends on another non-key attribute).

Justification with Examples

Example 1: Table – Case_Criminal

- **Composite Key**: (Case_ID, Criminal_ID)
- **Functional Dependency**: (Case_ID, Criminal_ID) → Charges
- **Analysis**: The composite key fully determines the attribute Charges. There is no dependency on part of the key, nor is there any transitive dependency.
- **Conclusion**: The table is in **BCNF**.

Example 2: Table – Officer

- **Primary Key**: Officer_ID
- **Functional Dependency**: Officer_ID → Name, DOJ, Rank, Department
- **Analysis**: All non-key attributes are fully dependent on the primary key with no partial or transitive dependencies.
- **Conclusion**: The table is in **BCNF**.

Conclusion:

All relations in the Crime Record Management System are normalized to **BCNF**, ensuring:

- Minimal redundancy
- Optimal query performance
- High data integrity

No further decomposition or normalization steps are necessary