1. Design the ERD for the system:

Let's start by identifying the main entities and their relationships.

Entities:

Musician

Instrument

Album

Song

Relationships:

Performs (between Musician and Instrument)

Records (between Musician and Song)

Appears_On (between Song and Album)

Produces (between Musician and Album)

Attributes:

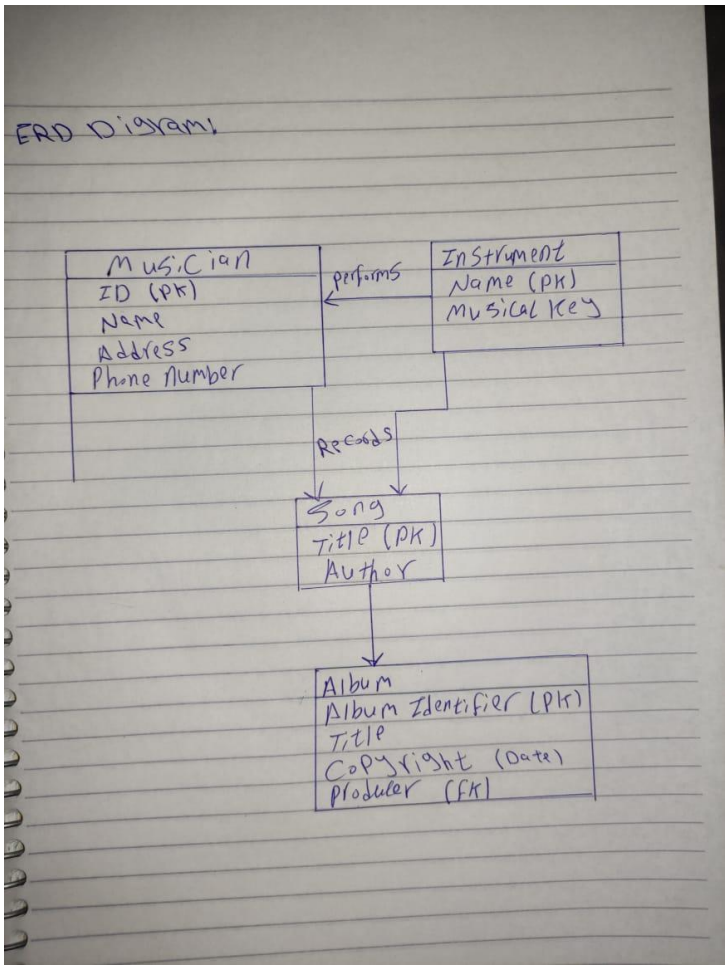
Musician: ID (PK), Name, Address (Street, City), Phone Number

Instrument: Name (PK), Musical Key

Album: Album Identifier (PK), Title, Copyright Date, Producer (FK to Musician)

Song: Title (PK), Author

ERD Diagram:



2. Apply Normalization:

Normalization is a multi-step process to organize the data to eliminate redundancy and dependency problems.

Assumptions:

Each Musician has a unique ID.

Each Instrument has a unique Name.

Each Song has a unique Title.

Each Album has a unique Album Identifier.

First Normal Form (1NF):

All attributes should be atomic (indivisible).

Ensure each field has a unique name.

Second Normal Form (2NF):

Meet the requirements of 1NF.

Remove partial dependencies (attributes that are only partially dependent on the primary key).

Third Normal Form (3NF):

Meet the requirements of 2NF.

Eliminate transitive dependencies (non-prime attributes depend on other non-prime attributes).

3. Apply Mapping:

Mapping is the process of transforming the ERD into a relational schema (tables).

Relational Schema:

Musician (ID, Name, Address, Phone Number) [PK: ID]

Instrument (Name, Musical Key) [PK: Name]

Song (Title, Author) [PK: Title]

Album (Album Identifier, Title, Copyright Date, Producer) [PK: Album Identifier, FK: Producer (references Musician)]

Performs (MusicianID, InstrumentName) [PK: (MusicianID, InstrumentName), FK: MusicianID (references Musician), FK: InstrumentName (references Instrument)]

Records (MusicianID, SongTitle) [PK: (MusicianID, SongTitle), FK: MusicianID (references Musician), FK: SongTitle (references Song)]

Appears_On (SongTitle, AlbumIdentifier) [PK: (SongTitle, AlbumIdentifier), FK: SongTitle (references Song), FK: AlbumIdentifier (references Album)]

Produces (MusicianID, AlbumIdentifier) [PK: (MusicianID, AlbumIdentifier), FK: MusicianID (references Musician), FK: AlbumIdentifier (references Album)]

This schema maintains the relationships and cardinalities from the ERD while adhering to normalization principles.