

## Normalization Example

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### Question 6.0 (not in the textbook)

*A movie database records the title, actors, and genre of each movie. Normalize the following relation, and indicate the primary and foreign key attribute types.*

*Movie(movieId, title, year, actor(actorId, charId, realName, charName, creditOrder), genreId, genre)*

*Note: A movie can have multiple actors but only one genre.*

### First Normal Form

1NF is violated because actor is a composite attribute type. It is also multivalued attribute type. The relation can be brought into 1NF as follows:

Movie(movieId, title, year, genreId, genre)

Actor(*movieId*, actorId, charId, realName, charName, creditOrder)

### Second Normal Form

Actor is not in 2NF because realName is partially dependent on (movieId, actorId, charId) – it only depends on actorId. The same holds for charName and charId. The relation can be brought into 2NF as follows:

Movie(movieId, title, year, genreId, genre)

Actor(actorId, realName)

Char(charId, charName)

Cast(*movieId*, *actorId*, *charId*, creditOrder)

### Third Normal Form

The relation Movie is not in 3NF since we have a transitive functional dependency from movieId to genre via genreId. It can be brought into 3NF as follows:

Movie(movieId, title, year, *genreId*)

Actor(actorId, realName)

Char(charId, charName)

Cast(*movieId*, *actorId*, *charId*, creditOrder)

Genre(genreId, genre)