Basics of database systems

Project – Database design

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Software Engineering

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Example text: Music database

The project ‘Music database’, is developed for a music streaming and management application. The database addresses user management, artist and song information, playlist creation and listener tracking. Key features include capturing user details, maintaining artist and song catalogs, facilitating playlist management, and tracking user-song interactions.

Five critical queries are proposed to enhance user experience, including playlist management, insights into popular songs, artist-centric exploration, personalized listening history and showcase of artists on playlists. The database aims to create a sophisticated and personalized music streaming experience, leveraging data-driven insights to meet user expectations in the dynamic digital world.

modeling

Conceptual model

In Figure 1 is the ER model of the designed database. There are five entities in the model and five relationships. There are three N:M relationships in between entities and two 1:M relationships. The User entity has a derived attribute ‘age’. Additionally, there is multiple key attributes and normal attributes.

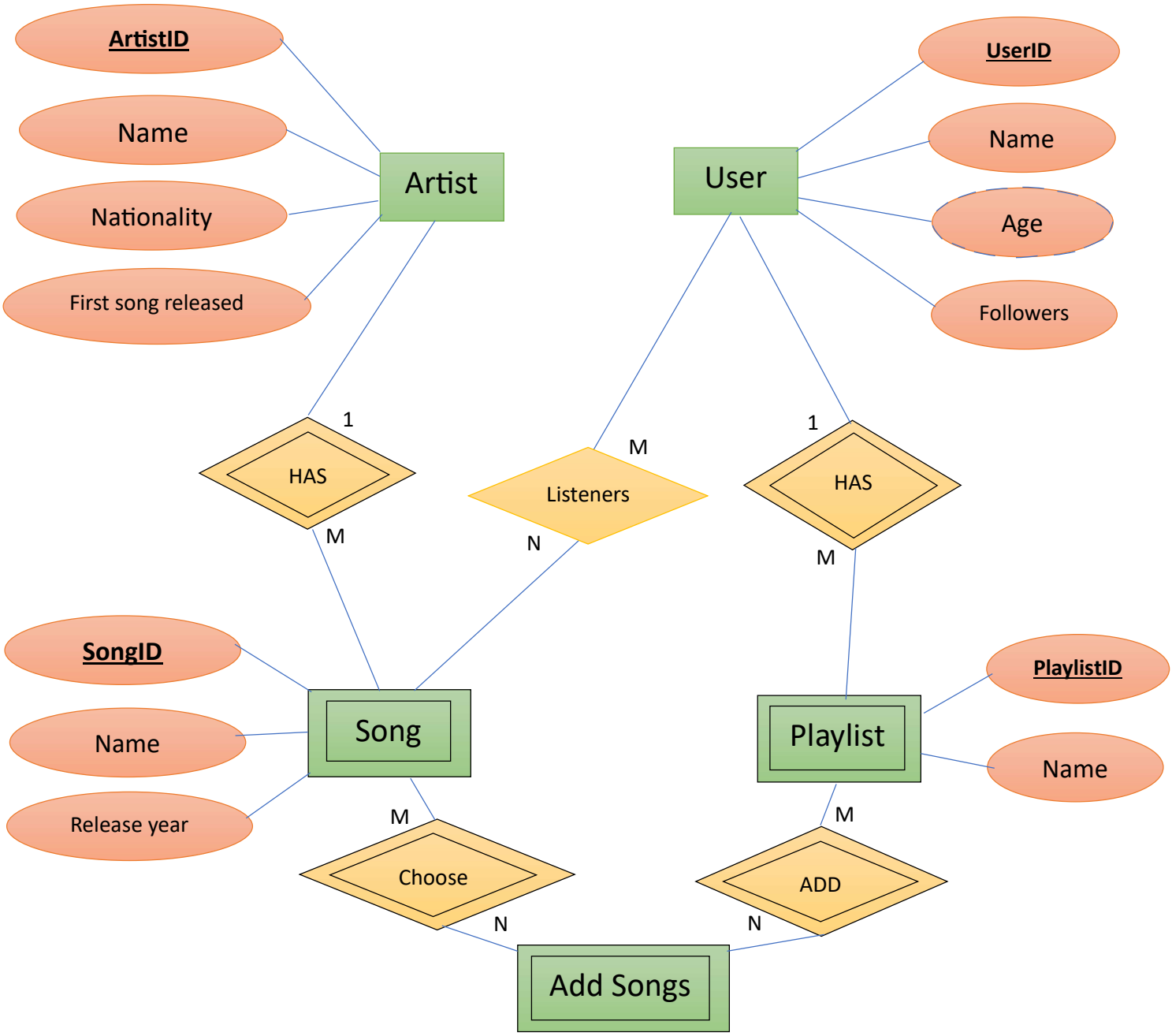

Figure 1: ER model

Logical model

Figure 2 shows the logical model that has been created based on the ER model. Due to the N:M relationship, an interim relation was created between User and Song.

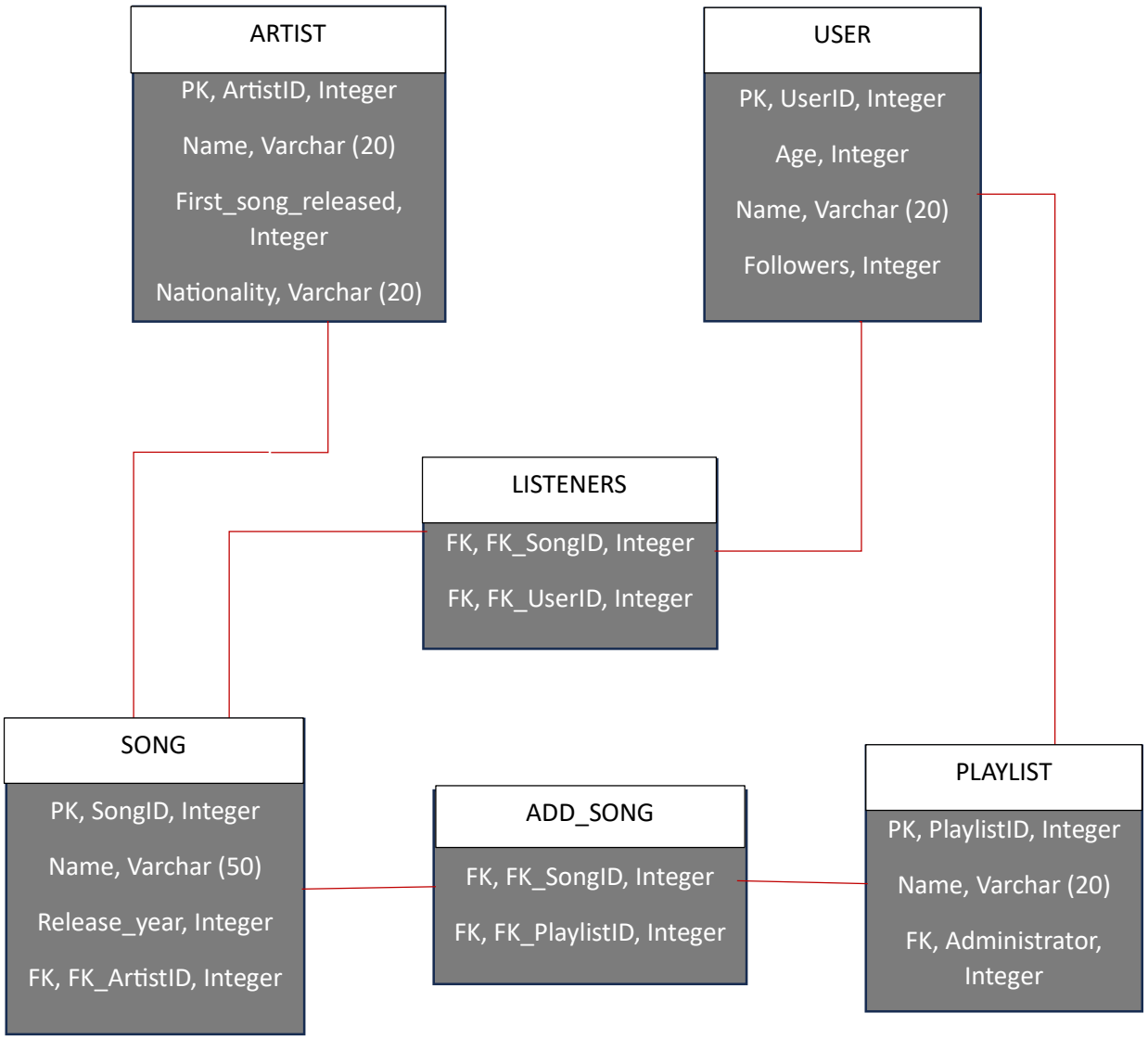

Figure 2: Logical model from the conceptual model

During implementation, the following constraints are created for the relations:

- **User**:
  - User id, name, age and followers cannot be null (NOT NULL)
  - Name must be unique (UNIQUE)
  - Age must be at least 14 years (CHECK)
  - Followers defaults to 0 (DEFAULT)
- **Song**:
  - Song id, name, release year of a song and fk artist id cannot be null (NOT NULL)
  - Name must be unique (UNIQUE)
  - Foreign key reference to Artist.
  - ON DELETE/ UPDATE CASCADE
- **Playlist**:
  - Playlist id, name and administrator cannot be null (NOT NULL)
  - Name must be unique (UNIQUE)
  - Foreign key reference to User
  - ON DELETE/UPDATE CASCADE
- **Artist**:
  - Artist id, name, release year of the first song and nationality cannot be null (NOT NULL)
  - Name must be unique (UNIQUE)
- **Listeners**:
  - Foreign key reference to song and user
  - Foreign key cannot be null (NOT NULL)
  - ON DELETE/UPDATE CASCADE

- **Add songs**:
  - Foreign key reference to song and playlist.
  - Foreign key cannot be null (NOT NULL)
  - ON DELETE/UPDATE CASCADE