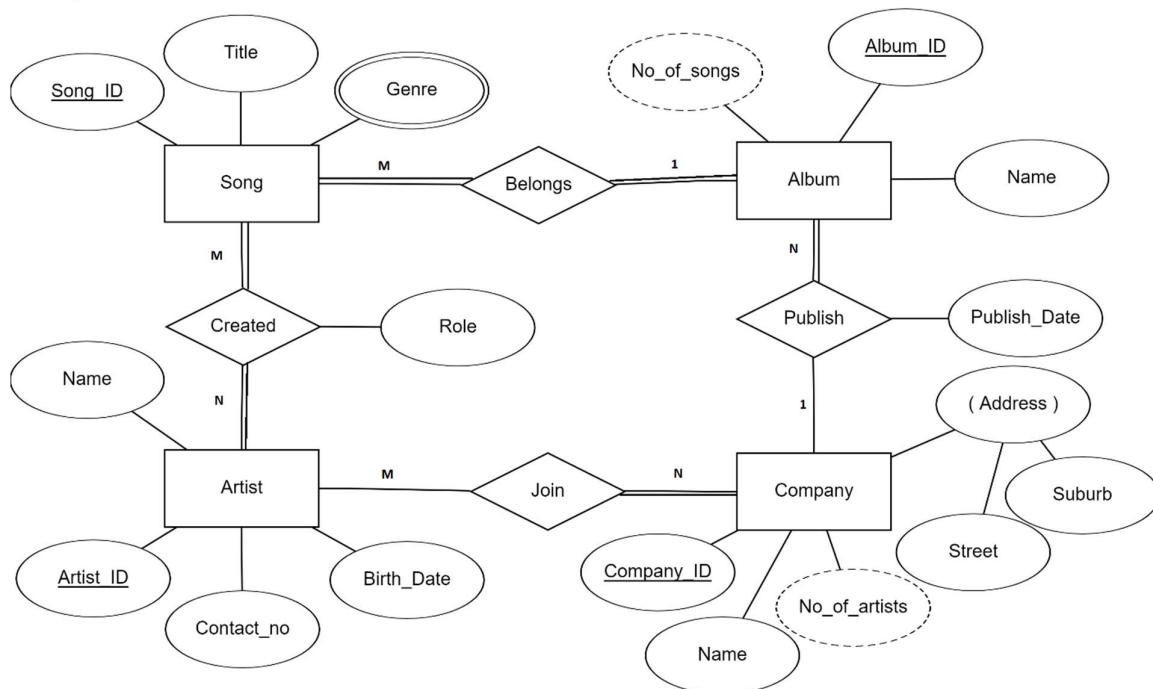Name : Kovid Sharma
ZID : 5240067
COMP9311

Assignment 1

Question 1 (6 marks)

A music organization hires you to design a small database to store information about the creation and publication of songs. You're given the following requirements:
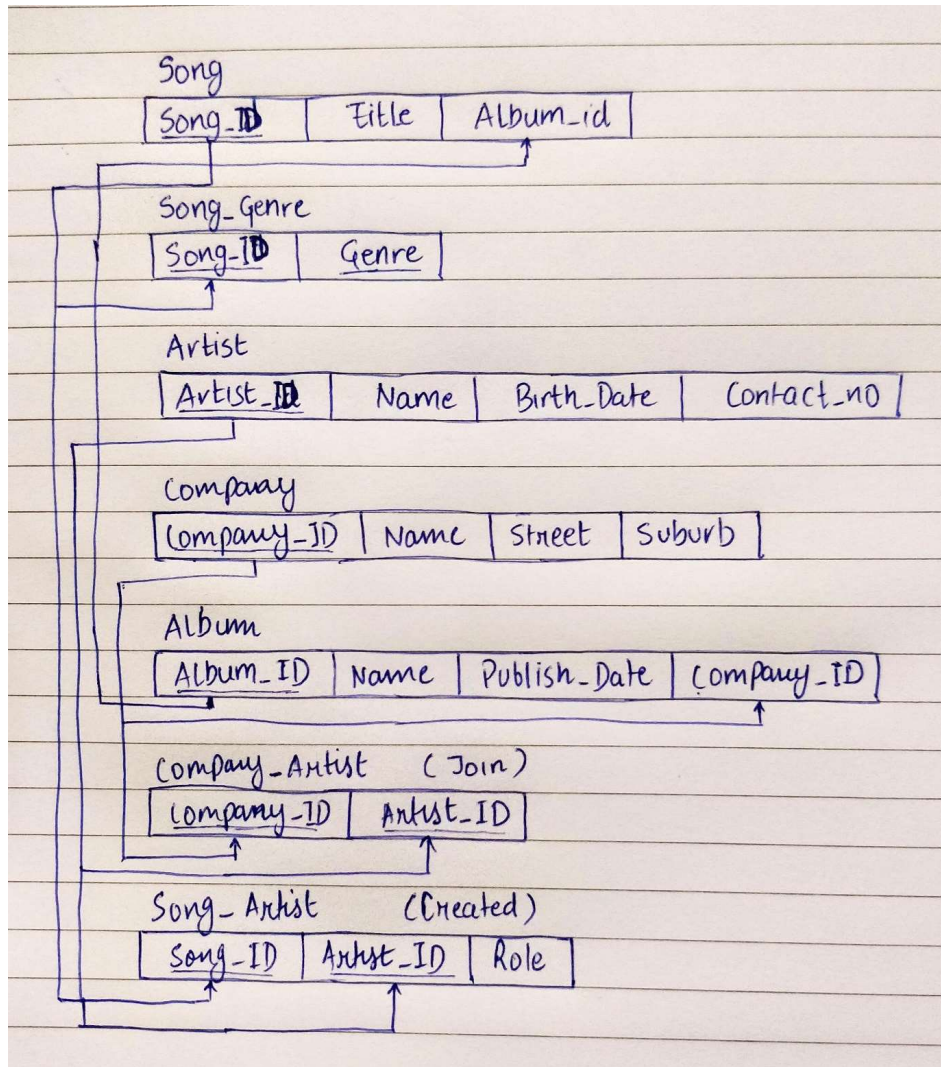
★ A song is identified by song ID. For each song, we want to record its title and genres. A song may have multiple genres.

★ An artist is identified by his/her artist ID and we also record his/her name, birth date, and contact number. A song must be created by one or more artists and an artist must have created at least one song. We also want to record the role (e.g. writer, producer) when an artist participates in the creation of a song.

★ A company is identified by its company ID, and we also need to know its name and address. The address is composed of street and suburb. An artist may join multiple companies and a company must have at least one artist. Some artists may not join any companies. The number of artists in a company is needed.

★ An album is uniquely identified by its album ID, and we also need to know its name. An album must have one or more songs. A song must belong to exactly one album. We also want to know the number of songs in an album. For each album, we record the company which publishes it. A company may publish zero or more albums and an album must be published by exactly one company. We also want to record the publish date of an album.

ER diagram:

Question 2 (6 marks)

Relational model

Song

Song_ID	Title	Album_id

Song_Genre

Song_ID	Genre

Artist

Artist_ID	Name	Birth_Date	Contact_no

Company

Company_ID	Name	Street	Suburb

Album

Album_ID	Name	Publish_Date	Company_ID

Company_Artist (Join)

Company_ID	Artist_ID

Song_Artist (Created)

Song_ID	Artist_ID	Role

Question 3 (8 marks)

Write relational algebra expression to answer the following questions:
1) Find the titles of 'comedy' movies that are shown in the 'Event' cinema at 'George St'.
Tables used:
Movie (mID, title, runningTime, releaseDate)
Cinema (cID, cName, location)
GenreOfFilm (mID, genre)
MovieShowing (mID, cID, sDate, eDate)

Ans 1:

$\text{Cinemaselection} \leftarrow \sigma_{(\text{cName = 'Event' AND location = 'George St'})} (\text{Cinema})$

$\text{mIDselection} \leftarrow \pi_{(\text{mID})} (\text{MovieShowing} \bowtie \text{Cinemaselection})$

$\text{Genreselection} \leftarrow \pi_{(\text{mID})} (\sigma_{(\text{genre = 'comedy'})} (\text{GenreOfFilm} \bowtie \text{mIDselection}))$

$\pi_{(\text{title})} (\text{Movie} \bowtie \text{Genreselection})$

2) Find the titles and release dates of movies that are shown in both the 'Event' cinema at 'Chatswood' and the 'Hoyts' cinema at 'Chatswood'.
Tables used:
Movie (mID, title, runningTime, releaseDate)
Cinema (cID, cName, location)
MovieShowing (mID, cID, sDate, eDate)

Ans 2:

$\text{CEvent} \leftarrow \pi_{(\text{cID})} (\sigma_{(\text{cName = 'Event' AND location = 'Chatswood'})} (\text{Cinema}))$

$\text{CHoyts} \leftarrow \pi_{(\text{cID})} (\sigma_{(\text{cName = 'Hoyts' AND location = 'Chatswood'})} (\text{Cinema}))$

$\text{Result} \leftarrow \text{CEvent} \cup \text{CHoyts}$

$\text{Moviesshown} \leftarrow (\text{MovieShowing} \div \text{Result})$

$\pi_{(\text{title, releaseDate})} (\text{Movie} \bowtie \text{Moviesshown})$

3) Find the names of 'male' customers who have watched the movie 'Aquaman' directed by 'James Wan' and have not watched any other movies directed by him.
Tables used:
Movie (mID, title, runningTime, releaseDate)
Filming (dID, mID)
Customer (cusID, name, age, gender)
Director (dID, name, age, gender)

Ans 3:

$\text{DirJW} \leftarrow \sigma_{(\text{name = 'James Wan'})} (\text{Director})$

$\text{Aquaselection} \leftarrow \pi_{(\text{mID})} (\sigma_{(\text{title = 'Aquaman'})} (\text{Movie}))$

$\text{MoviesbyJW} \leftarrow \pi_{(\text{mID})} (\text{Filming} \bowtie \text{DirJW})$

$\text{AquamanbyJW} \leftarrow \pi_{(\text{mID})} (\text{Filming} \bowtie \text{Aquaselection})$

$\text{CustomersAquaJW} \leftarrow \pi_{(\text{cID})} (\text{WatchMovie} \bowtie \text{AquamanbyJW})$

$\text{MoviesJWnotAquaman} \leftarrow (\text{MoviesbyJW} - \text{AquamanbyJW})$

$\text{CustomersnotAquaman} \leftarrow \pi_{(\text{cID})} (\text{WatchMovie} \bowtie \text{MoviesJWnotAquaman})$

$\text{Customersselection} \leftarrow \pi_{(\text{mID})} (\text{Filming} \bowtie \text{Aquaselection})$

$\pi_{(\text{name})} (\sigma_{(\text{gender = 'male'})} (\text{Customer} \bowtie \text{Customersselection}))$

4) Find the names of directors who have been to a cinema to watch a 'fantasy' and 'violence' movie directed by himself.
Tables used:
Director (dID, name, age, gender)
Filming (dID, mID)
GenreOfFilm (mID, genre)
WatchMoive (cusID, mID, cID, date)

Ans 4:

$$\text{FantasyMovies} \leftarrow \sigma_{(\text{genre = 'fantasy'})} (\text{GenreOfFilm})$$

$$\text{ViolenceMovies} \leftarrow \sigma_{(\text{genre = 'violence'})} (\text{GenreOfFilm})$$

$$\text{Movieselection} \leftarrow \text{FantasyMovies} \cap \text{ViolenceMovies}$$

$$\text{Customerselection} \leftarrow \pi_{(\text{cID})} (\text{WatchMovie} \bowtie \text{Movieselection})$$

$$\text{DirID} \leftarrow \pi_{(\text{dID})} (\text{Filming} \bowtie \text{Movieselection})$$

$$\text{DirMovie} \leftarrow \pi_{(\text{name})} (\text{Director} \bowtie \text{DirID})$$

$$\text{Customernames} \leftarrow \pi_{(\text{name})} (\text{Customer} \bowtie \text{Customerselection})$$

$$\pi_{(\text{name})} (\text{Customernames} \bowtie \text{DirMovie})$$

5) Find the names of the customers aged between '30' and '50' who have watched all the films whose running time is longer than '120' minutes and have never been to any 'Hoyts' cinema.
Tables used:
Movie (mID, title, runningTime, releaseDate)
Cinema (cID, cName, location)
Customer (cusID, name, age, gender)
WatchMoive (cusID, mID, cID, date)

Ans 5:

$$\text{Movieselection} \leftarrow \sigma_{(\text{runningTime > 120})} (\text{Movie})$$

$$\text{Customerselection} \leftarrow \sigma_{(\text{age >= 30 AND age >= 50})} (\text{Customer})$$

$$\text{Final} \leftarrow (\text{Customerselection} \bowtie \text{WatchMovie}) \div (\text{Movieselection} \bowtie \text{WatchMovie})$$

$$\text{CHoyts} \leftarrow \sigma_{(\text{location = 'Hoyts'})} (\text{Cinema})$$

$$\pi_{(\text{name})} (\text{Final} - \text{CHoyts})$$