

Queries in relational algebra

Q1: Suppose a Marvel fan wants to see the names of the characters, who have been embodied by different actors, as well as the name of these actors.

TABLES USED: ACTORS (actorID, name, nationality, dateOfBirth, sex, oscarsWon, charName)

QUERY: $A \leftarrow \pi_{\text{actorID}, \text{name}, \text{charName}}(\text{ACTORS})$
 $\pi_{\text{cName}, \text{name}, \text{aName}}((A \bowtie_{\text{charName} = \text{cName} \wedge \text{actorID} \neq \text{aID}} \rho_N(\text{cName}, \text{aID}, \text{aName})(A)))$

Q2: Suppose a Marvel fan wants to see the name and the date of the movies, whose cast involves Chris Evans.

TABLES USED: ACTORS (actorID, name, nationality, dateOfBirth, sex, oscarsWon, charName)
MOVIES(movieName, duration, releaseDate, sequenceOfEvents, oscarsWon, budget, boxOffice)
MOVIES_HAVE_CHARACTERS(movieName, charName)

QUERY: $A \leftarrow \pi_{\text{movieName}}(\sigma_{\text{name} = \text{"Chris Evans"}}(\text{ACTORS}) \bowtie (\text{MOVIES_HAVE_CHARACTERS}))$
 $\pi_{\text{movieName}, \text{releaseDate}}(A \bowtie \text{MOVIES})$

Q3: Suppose that a Marvel fan is interested in learning about the type and description of events that took place in the first 20, chronologically *, Marvel movies.

*The term chronologically refers to the time of the Marvel world and not to real time

TABLES USED: MOVIES(movieName, duration, releaseDate, sequenceOfEvents, oscarsWon, budget, boxOffice)
EVENTS(eventID, type, description, movieName, locationID)

QUERY: $\pi_{\text{type}, \text{description}}(\sigma_{\text{sequenceOfEvents} \leq 20}(\text{MOVIES}) \bowtie (\text{EVENTS}))$

Q4: We assume that a Marvel fan is interested in finding out which movies cost over \$250,000,000, as well as their profits.

TABLES USED: MOVIES(movieName, duration, releaseDate, sequenceOfEvents, oscarsWon, budget, boxOffice)

QUERY: $\pi_{\text{movieName}, \text{budget}, \text{boxOffice}}(\sigma_{\text{budget} > 250.000.000}(\text{MOVIES}))$

Q5: We assume that a Marvel fan wants to know the locations and planets where battle has taken place but not death. Both battle and death are considered as events.

TABLES USED: EVENTS(eventID, type, description, movieName, locationID)
LOCATIONS(locationID, name, planet, latitude, longitude)

QUERY: $A \leftarrow \pi_{\text{type}, \text{description}, \text{locationID}}(\text{EVENTS}) \bowtie \pi_{\text{planet}, \text{locationID}, \text{name}}(\text{LOCATIONS})$
 $\pi_{\text{planet}, \text{name}}(\sigma_{\text{type} = \text{battle}}(A)) - \pi_{\text{planet}, \text{name}}(\sigma_{\text{type} = \text{death}}(A))$

Q6: Suppose a Marvel fan wants to see the name of the movie with the longest duration.

TABLES USED: MOVIES(movieName, duration, releaseDate, sequenceOfEvents, oscarsWon, budget, boxOffice)

QUERY:
$$A \leftarrow \pi_{\text{MOVIES.movieName, MOVIES.duration}}(\sigma_{\text{MOVIES.duration} < D.\text{duration}}(\text{MOVIES} \bowtie \rho_D(\text{MOVIES})))$$
$$\pi_{\text{MOVIES.movieName, MOVIES.duration}}(\text{MOVIES}) - A$$

Q7: Suppose a Marvel fan wants to see the names of the movies, whose cast includes both Robert Downey Jr. and Chris Evans.

TABLES USED: ACTORS(actorID, name, nationality, dateOfBirth, sex, oscarsWon, charName)
MOVIES_HAVE_CHARACTERS(movieName, charName)
MOVIES(movieName, duration, releaseDate, sequenceOfEvents, oscarsWon, budget, boxOffice)

QUERY:
$$A \leftarrow \pi_{\text{movieName}}(\sigma_{\text{name} = \text{"Robert Downey Jr."}}(\text{ACTORS} \bowtie \text{MOVIES_HAVE_CHARACTERS}))$$
$$B \leftarrow \pi_{\text{movieName}}(\sigma_{\text{name} = \text{"Chris Evans"}}(\text{ACTORS} \bowtie \text{MOVIES_HAVE_CHARACTERS}))$$
$$A \cap B$$

Q8: Suppose a user is interested in finding out the ID and the name of the producer who has appeared in all Marvel Studios Movies.

TABLES USED: MOVIES(movieName, duration, releaseDate, sequenceOfEvents, oscarsWon, budget, boxOffice)
MOVIES_HAVE_PRODUCERS(producerID, movieName)
PRODUCERS(producerID, name, dateOfBirth, sex)

QUERY:
$$\text{MOVIES_HAVE_PRODUCERS} \div \pi_{\text{movieName}}(\text{MOVIES})$$
$$A \leftarrow \text{MOVIES_HAVE_PRODUCERS} \div \pi_{\text{movieName}}(\text{MOVIES})$$
$$\pi_{\text{name}}(\text{PRODUCERS} \bowtie A)$$

Q9: Suppose a Marvel fan wants to see all the events and specifically their descriptions, in which either death or battle has occurred.

TABLES USED: EVENTS(eventID, type, description, movieName, locationID)

QUERY:
$$\pi_{\text{description}}(\sigma_{\text{type} = \text{"death"}}(\text{EVENTS}) \cup \sigma_{\text{type} = \text{"battle"}}(\text{EVENTS}))$$