

UNIVERSITY OF CALGARY
Department of Computer Science
CPSC 471 Database Management Systems

Winter 2021

Exam

Duration: 120 Minutes

(30 pts) Q1. Consider the following tables (relations) that contain information (all stored as names) about persons visiting theatres, movies played by theatres, movies liked by persons, and players who star in movies. A person can like several movies; a movie can be liked by many persons. A person can go to several theatres, and a theatre is visited by many persons. A theatre can play many different movies, and a movie can be played by several theatres. A player may star in several movies and a movie may involve many players, further a player may be a person, that is, some persons are players.

Please note that in all the queries <i>some</i> <i>means</i> <i>at least one</i>

Goes(person, theatre) **Plays**(theatre, movie) **Likes**(person, movie) **Stars**(movie, player)

Code (a, b) in SQL

- (5) **a)** Find persons who go only to theatres that play some movies liked only by “Trump”?
- (5) **b)** Find movies where “Clinton” starred (as player) and which were played by at least 100 theatre visited by “Biden”?

Code (c, d) using Relational Algebra:

- (5) **c)** Find persons who go to theatres that do not play any of the movies they like?
- (5) **d)** Find every movie played by at least one theatre and liked by at least one person who stars in the movie

Code (e, f) in tuple relational calculus:

- (5) **e)** Find every person who goes to theatres that play all the movies in which he/she starred?
- (5) **f)** Find every theatre which plays movies liked by at least one player?

(20 pts) Q2. Assume you have been asked to develop a database conceptual model for the covid-19. You have been given the freedom to come up with your own design but with the following restrictions.

1. You must have at least five entities which may include things like country, virus, patients, hospitals, drugs, vaccines, pharmacological companies, etc.
2. Each entity should have at least three attributes, including a primary key which should be underlined.
3. You should have reasonable relationships between the entities with
 - a. at least one recursive (self-referencing) relationship,
 - b. at least one relationship which connects more than two entities, and
 - c. at least two binary relationships.
 - d. at least one of the relationships should have at least one attribute.
 - e. specify the cardinality of each relationship with at least one many-to-many relationship

Solve the following:

- a. Draw your own extended or normal entity-relationship diagram which satisfies the above requirements. Your design should be sound and reflects a practical case.
- b. Transform your ERD or EERD into a relational model, you may or may not use arrows.