CS 4163/6523: Introduction to Database Systems
Homework 3

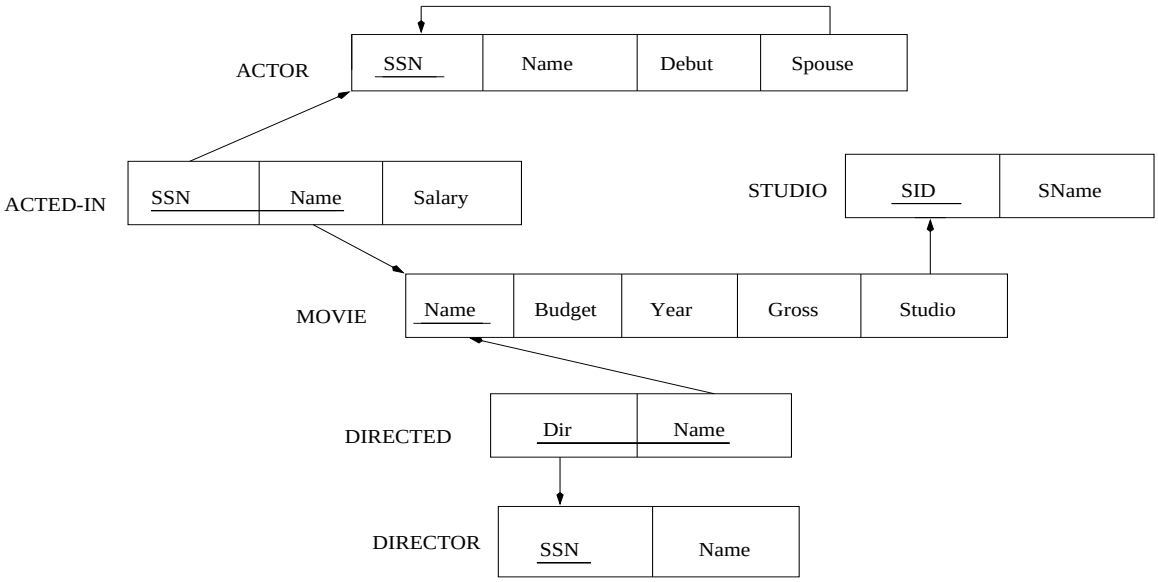

Figure 1: Movie database schema.

Problem 1: Write relational algebra queries for the following queries given the schema in Figure 1.

1. Find actors who get paid more than 1M in a movie released before 1990.
2. Find actors that have acted in all movies under the "New Banner" studio.
3. Find directors who have directed themselves and the name of the corresponding movie.
4. Find actors all of whose movies have been high grossers ($> 50M$).
5. Find actors who have acted in all movies directed by X and in no other movie.

Problem 2: Given the DB schema in Figure 1 draw the canonical query tree and the corresponding optimized query tree for the following SQL query. Justify the order of joins you have used in the latter tree.

```
SELECT    M.Name
FROM      ACTOR, ACTED_IN, MOVIE M, DIRECTED, DIRECTOR
WHERE     DIRECTOR.Name = 'Akira Kurosawa'  AND
          ACTOR.Name = 'Toshiro Mifune' AND
          Dir = DIRECTOR.SSN AND
          M.Name = DIRECTED.Name AND
          ACTED_IN.Name = M. Name AND
          ACTOR.SSN = ACTED_IN.SSN;
```