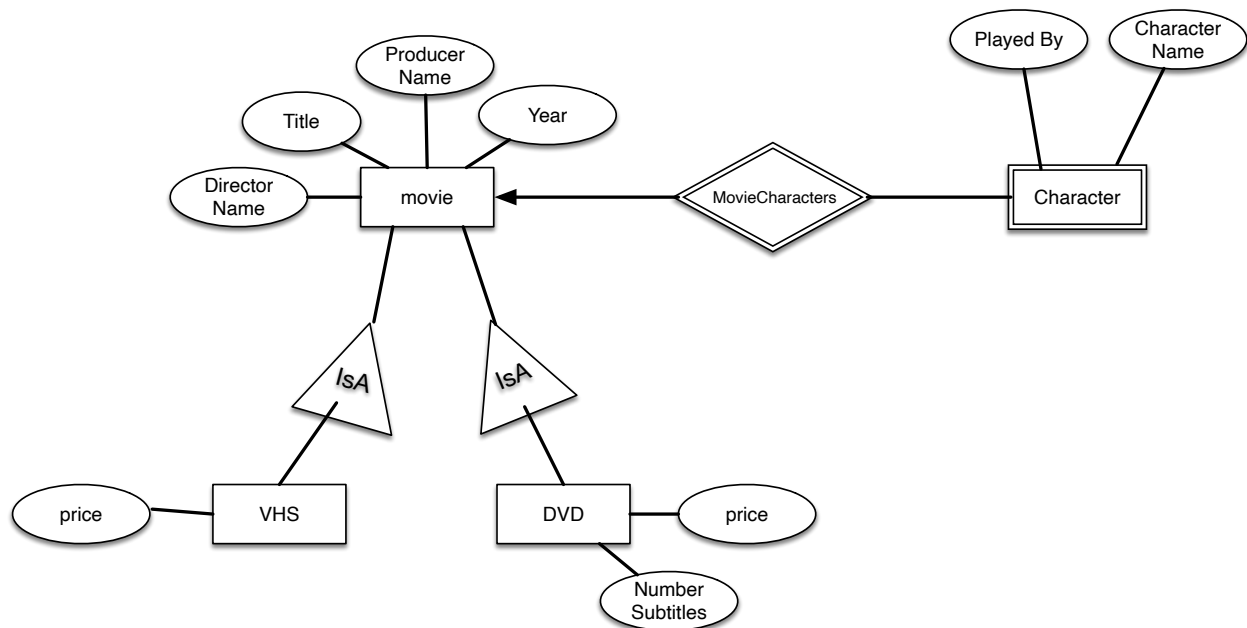


Midterm Databases Spring 2020

Please turn in in typeset form. Only long distance students can use email: thomas.schwarz@marquette.edu. Please document all use of outside sources such as books other than the textbook or websites.

- (1) A long time ago, people would watch movies at home by going to a shop and rent or buy physical media with a digital movie on them. They would then use a DVD player or a VCR player to reproduce the media on a screen. The following is an ER diagram for the database of a shop that sells movies in either VHS or DVD format.

70 pts



Each movie is available as a VHS or a DVD movie or both. Different formats may have different prices. The attribute Number Subtitles indicates the number of subtitle language options available on the DVD. The character is a character in a movie. 'James Bond' would be a different character for as many movies as there are in which there is an important character names 'James Bond'. The played-by attribute gives the name of the actress or actor that plays the character in that movie. The movie entity has the year, the title, the director's name (e.g. 'Cohen Brothers') and the producer's name.

- Translate the ER diagram into a relational database scheme. Try to avoid NULL values. How do you deal with the fact that a movie might be available in both VHS and DVD format and have different attributes accordingly.
- What would be the best key for movies? People usually do not remember producer names or even director names, so that is not a good way to look them up. This means that the answer is title and year.

- (c) What is the best key for Character? Because it is a weak entity, you can deduce what solution I have in mind.
- (d) Create a MySQL database that implements the schema that you developed. Use reasonable constraints. (You might want to look up "composite key as foreign key".)
- (e) Write a MySQL query for
 - (a) Find all VHS movies where 'Sean Connery' plays a character names 'James Bond'.
 - (b) Find the number of all movies that are available in both VHS and DVD.

10 pts

2. Find an explicit counter example that the following rule on functional dependencies is **wrong**: "If $AB \rightarrow C$, then $A \rightarrow C$ ".

10 pts

3. Assume a table with attributes (A,B,C,D) has FD's $A \rightarrow B$ and $B \rightarrow C$. Give the BCNF of the table.

10 pts

4. Use the chase test to determine whether the decomposition of $R(A, B, C, D, E)$ into $S(A, B, C)$, $T(B, C, D)$ and $V(C, D, E)$ with FDs $A, B \rightarrow C$, $B \rightarrow D$, and $C, D \rightarrow E$ in R is a lossless decomposition?