

(4) Whose movies have all made less than 20 million? (GRADING: CHUNGLAE)

RC:

$$\{S.STAR \mid STARRED_IN(S) \wedge \forall(M, S_2)(MOVIE(M) \wedge STARRED_IN(S_2) \wedge S.STAR = S_2.STAR \wedge M.NAME = S_2.NAME \Rightarrow M.BOX_OFF < 20)\}$$

Alternative solution:

$$\{S.STAR \mid STARRED_IN(S) \wedge \neg \exists(M, S_2)(MOVIE(M) \wedge STARRED_IN(S_2) \wedge S.STAR = S_2.STAR \wedge M.NAME = S_2.NAME \wedge M.BOX_OFF \geq 20)\}$$

RA:

$$BIG \leftarrow \pi_{STAR}(\sigma_{BOX_OFF > 20}(MOVIE) [Natural_Join] STARRED_IN)$$

$$ANS \leftarrow \pi_{STAR}(STARRED_IN) - BIG$$

(30 points) **Problem 3.** Consider the following ER model, which is an answer to a question from Quiz #1. Transform this model into a set of relations. In the resulting relational model, be sure to indicate each relation's keys, as well as all of the foreign keys. It is also OK to create any surrogate keys that you'd like. If you do, please point out where those are. (GRADING: CHUNGLAE)



