EBERHARD KARLS
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Datenbanksysteme I
WS 2019/20
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Assignment #11
Submission Deadline: January 21, 2020 - 10:00

Exercise 1:   Twenty-One   **(10 Points)**

rank	score value
$2, 3, 4, 5, 6, 7, 8, 9, 10$	same as rank
J, Q, K	10
A	11

Figure 1: Ranks and their score values (represented in column `value` of table `cards`)

Recall the poker card deck from Assignment #04. Back then we were missing the abilities to formulate sensible queries on our card decks.

Please become familiar with the schema and the start state provided to you in the archive `17u4schema.zip`.

Now that we are supplied with a set of powerful SQL tools we can use them to calculate a player's chances in the popular card game *Twenty-one* (also known as *Pontoon* or *17&4*). Our variant of *Twenty one* defines the following basic rules:

- Before the game starts every player is dealt two cards (visible for everybody) (see: start state in table `game`).

- Every player may draw an additional card during each round of the game

- The players' scores are calculated by adding up the *score values* assigned to the ranks of their cards (see Figure 1).

- Goal of the game: a player's final score must exceed the opponent's score without surpassing 21.

Before drawing a card a player has to judge the risk of exceeding 21 with the next dealt card.
Your task is to formulate a SQL query that calculates the probability p (with $0 \leq p \leq 100$) of exceeding 21 with the upcoming turn for every single player.

    result(player, fail_probability)

For the start state given in **game** your query should calculate the following result:

game		
player	suit	rank
Madita	♢	3
Madita	♢	5
Frida	♢	4
Frida	♣	9
Thor	♡	B
Thor	♢	A

result	
player	fail_probability
Madita	0
Frida	45.6521739130435
Thor	100

For example, player *Frida* has a current score of 13. If she draws

- (♠, 6) she does not fail (yet)

- (♡, 9) her score exceeds 21, hence she fails

Based on the remaining cards her probability to fail is 45.6521739130435%. However, *Thor*'s current score is 21 already. Therefore his failure probability is 100%.

Exercise 2:   Verbalizing an ER Diagram   **(5 Points)**

Consider the entity relationship diagram in Figure 2. Turn this ER diagram into an accurate verbal description that reads similar to the one found in Assignment #10, Exercise 2. In particular, carefully verbalize the relationship cardinalities. Each sentence should meaningfully describe the ER model such that a board game collector could comprehend the general idea the ER model represents without the help of Figure 2. Please keep your descriptions brief and concise.
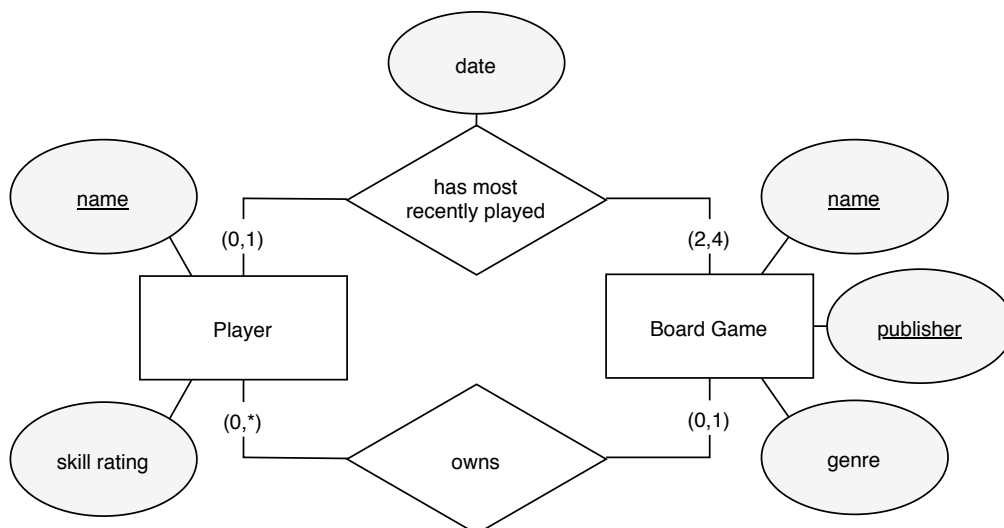

Figure 2: Entity relationship model of a board game collection