ASSIGNMENT 1b - 601.315/415/615 - Databases

Due date: Tuesday, October 3, 2023 at 11:59PM EDT

Part 1: Relational Algebra from HW1a (15 points)

1.3 (*15 points*) Students in 601.415/615 should write relational algebra expressions to answer all 8 of the queries from HW1a. You may use assignment to intermediate relations to make your expressions clearer. *Students in 601.315 only need write relational algebra expressions for any 6 of these queries.*

Part 2: Relational Algebra and Relational Calculus (45 points)

Consider the following relational database schema (with sample instantiations):

Consider the following hypothetical database schema. Suppose all bars in the US have a unique bar license number (BNO) and each drinker is identified by a unique drivers' license number (DLicNo). Every time a drinker represented by DLicNo goes to a bar represented by BNO, the information is recorded in the database. The number of times a drinker visits a particular bar can be obtained by examining the VISIT relation. The VISIT relation has the DLicNo and the BNO pair only if the drinker represented by DLicNo has visited the bar represented by BNO at least once, i.e. *the attribute NumberOfTimes in VISIT is never zero.* The relation LIKES represents all the beers that a particular drinker likes and the relation SERVES represents all the beers a particular bar serves.

BAR	BNO	BarName	BCity	BState
	L22174	*The Red Fox*	*Towson*	*MD*
	L31927	*OctoBar*	*Charles Village*	*MD*
	L59871	*BatBar*	*Georgetown*	*DC*

DRINKER	DLicNo	DName	DCity	Age	Political Party
	AK117229	*Joe Biden*	*Washington*	*80*	Democratic
	RF931253	*Kim Kardashian*	*Los Angeles*	*36*	Independent
	UU761326	*Jeff Bezos*	*Seattle*	*51*	Democratic
	MD891129	*Donald Trump*	*Palm Beach*	*77*	Republican
	FL931819	*Ron DeSantis*	*Tallahassee*	*51*	Republican

VISIT	DLicNo	BNO	NumberOfTimes
	UU761326	*L22174*	*93*
	MD891129	*L22174*	*1*
	MD891129	*L59871*	*1*
	AK117229	*L59871*	*2*

LIKES	DLicNo	BeerName
	AK117229	*Bud Lite*
	AK117229	*Rolling Rock*
	MD891129	*Sam Adams*

SERVES	BNO	BeerName
	L22174	*Bud Lite*
	L59871	*Bud Lite*
	L59871	*Rolling Rock*

HAS_PROPERTY	BeerName	Heaviness	Type
	Sam Adams	Standard	Lager
	Guinness Red	Heavy	Stout
	Bud Lite	Light	Lager
	Rolling Rock	Standard	PaleAle

Students in 601.415 and 601.615 should write answers for *all* 21 queries in the relational algebra, **and** should write relational calculus expressions for queries 2.1, 2.2, 2.3, 2.4, 2.9, 2.14, 2.17.

Students in 601.315 should write answers in the relational algebra for 9 of the queries 2.1-2.13 and all 4 of the queries 2.14-2.17, plus also 2.21 (all in the relational algebra). In addition, students in 601.315 should write relational calculus expressions for queries 2.1, 2.2, 2.3, 2.14, 2.17.

2.1 List the names of the bars in the database that Jeff Bezos has never visited.

2.2 List the names of bars in Maryland that are *not* in Baltimore **and** do not serve Bud Lite.

2.3 List the names of all people under 30 who have visited at least one bar in Georgetown and like Bud Lite *and* do not like Miller Lite.

2.4 List the name and age of everyone who has visited at least one bar that Jeff Bezos has visited.

2.5 List the names and ages of all people who have visited every bar in Towson.

2.6 List the names and ages of people who have visited at least every bar that Jeff Bezos has visited, and has visited all of these bars the identical number of times that Jef Bezos has visited the bar.

2.7 List the names and ages of people who have visited every bar that Jeff Bezos has visited and have never visited a bar that Kim Kardashian has visited.

2.8 List the names of people who have never drunk a beer named for them (e.g. "Sam Adams" drinking a beer called "Sam Adams"), but have visited at least 1 bar named for them.

2.9 List the name of every bar in Baltimore that serves a light beer that Jeff Bezos doesn't like.

2.10 List the name of every bar in Towson that serves no beer that is served in a Bar in Timonium.

2.11 List the name of all beers that both Jeff Bezos and Kim Kardashian like and are served at the same bar in the database (i.e. a bar where both Jeff and Kim could order a beer that they like).

2.12 List the name, city and state of the bar that serves the greatest number of different beers.

2.13 List the name and age of the drinker that likes the fewest number of different beers but likes at least one beer.

2.14 List the name and Political Party of all drinkers who like no beer that Donald Trump or Ron DeSantis likes.

2.15 List the name and Political Party of all drinkers who like every beer that Jeff Bezos likes.

2.16 List the name and Political Party of all drinkers who like every beer that Jeff Bezos or Kim Kardashian likes, and who don't like any beer that Donald Trump likes.

2.17 List the name and age of drinkers who like a PaleAle type beer but have not visited a bar which serves a PaleAle type beer.

2.18 List the name and age of drinkers who like more Lite beers than Heavy beers.

2.19 List the name of every bar that Jeff Bezos has visited more than once.

2.20 List the name and age of drinkers who have purchase all of the beers that are served at OttoBar and also purchased them at OttoBar.

2.21 Write an interesting query in English based on this database, and then answer it in the Relational Algebra (creativity, complexity and accuracy all count).