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CS6016

Lab 1: Relational Model and Keys

PART 1

- A student has a student ID, a name, and a GPA.

  Student [__sID (integer)__, name (string), GPA (real)]

- A grocery store needs to track an inventory of products for sale. It has zero or more of each type of product for sale, and needs to track the quantity and price for each product. A product has a name and a "stock keeping unit" (SKU) (hint: this is a real thing, you may google it). Remember that a valid table instance can't have duplicate rows - the store does not care about differentiating between individual items of the same product type, but it does want to be able to count them.

  Inventory [__SKU(string)__, Name(string), Quantity(integer), Price(Double)]

- Consider the grocery store database from the previous problem, but with a few differences: Now we don't care about tracking quantity, but we do want to track which aisle(s) the product is to be displayed on. Sometimes a product is displayed on more than one aisle in special display racks, but the product can not have multiple display cases per aisle. You may copy the relevant parts from your previous answer, but they will need modifications/additions.

  Product [__SKU (string)__, name (string), Price(Double)]

  Aisle table would need super key to make sure product can go in multiple aisles but only one display for aisle.

  Aisle [__SKU (string), aisleID (integer)__, Display (string)]

- A car has a make, model, year, color, and VIN (vehicle identification number). A salesperson has a name and a social security number, and is responsible for trying to sell zero or more cars. A car dealership has an inventory of cars and a set of salespeople. It needs to keep track of which car(s) each salesperson is

trying to sell. More than one salesperson can be assigned to any given car, but a car does not necessarily have any salespeople assigned to it.

Employee Directory[__Employee ID(integer)__, Name(string), Social Security(string), Cars Sold(int)]

Inventory[__ VIN(string)__, Make(string), Model(string), Year(int), color(string)]

Super key for Assignments to make sure that a single employee isn't getting assigned twice for the same vehicle.

Assignments[__Employee ID(integer), VIN(string)__]

PART 2

```
CREATE TABLE Patrons (
Name (string),
CardNum (integer),
UNIQUE (CardNum)
);
CREATE TABLE Inventory (
Serial(string)
ISBN(string)
UNIQUE (Serial)
);
CREATE TABLE CheckedOut (
CardNum(integer)
Serial(integer)
UNIQUE(Serial)
);
CREATE TABLE Phones (
CardNum(integer)
Phone(string)
);
CREATE TABLE Titles (
Serial(string)
Title(string)
Author(string)
UNIQUE(Serial)
);
```

PART 3

Employee Directory

Employee ID	Name	Social Security	Cars sold
1	Arnold Ham	111-11-1111	0
2	Hannah Turkey	222-22-2222	1000
3	Steve Chicken	333-33-3333	7

Inventory

VIN	Make	Model	Year	Color
A1B1171	Toyota	Tacoma	2008	Red
B768897	Toyota	Tacoma	1999	Green
89y9BFH	Tesla	Model 3	2018	White
78765GH	Subaru	WRX	2016	Blue
H6R6P9F	Ford	F150	2004	Red

Assignments

Employee ID	VIN
1	A1B1171
1	B768897
2	A1B1171
2	H6R6P9F
3	89y9BFH
3	78765GH

PART 4

Attribute Sets	Superkey?	Proper Subsets	Key?
{A1}	No	{}	No
{A2}	No	{}	No
{A3}	No	{}	No
{A1, A2}	Yes	{A1}, {A2}	Yes
{A1, A3}	No	{A1}, {A3}	No
{A2, A3}	No	{A2}, {A3}	No
{A1, A2, A3}	Yes	{A1}, {A2}, {A3}	No

PART 5

For each statement below, indicate whether it is true or false, and briefly explain your reasoning in one or two sentences. The variables "x", "y", and "z" below refer to attributes, not values. You do not need to give a formal mathematical proof, just give a well-reasoned explanation.

- If {x} is a superkey, then any set containing x is also a superkey.

True, because x can stand alone so anything paired with it would make a unique key.

- If {x} is a key, then any set containing x is also a key.

False, because a key could just be a column (not a super key) and there is no guarantee there won't be duplicate tuples.

- If {x} is a key, then {x} is also a superkey.

  True, A key could be considered a super key.

- If {x, y, z} is a superkey, then one of {x}, {y}, or {z} must also be a superkey.

  False, individually there could be duplicate tuples. We only know for sure that all three form a superkey and superkey can have extra attributes.

- If an entire schema consists of the set {x, y, z}, and if none of the proper subsets of {x, y, z} are keys, then {x, y, z} must be a key.

  True, the only way to have unique identifiers is all of them together.