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CS 143

Homework 1 Part 2

1.

a) See part 1

b) " " "

c) " " "

d)

Π hour, trips/100 (σ x (hourly_ridership))

where x = (((hour > 7) ^ (hour < 10)) ∨ hour = 7) ∨ (((hour > 17) ^ (hour < 19)) ∨ hour = 17)

e)

Π x (σ y (occupancy ⋈z weather))

x = occupancy.station, occupancy.datetime, condition, riders

y = condition = 'sunny' ∨ condition = 'rainy'

z = occupancy.station = weather.station ^ occupancy.datetime = weather.datetime\

2.

a)

```
CREATE TABLE scooter
(
        scooter_id              serial,
        flag                    integer         NOT NULL,
        home                    varchar(30)     NOT NULL,
        location                point,
        PRIMARY KEY(scooter_id)
);

CREATE TABLE user
(
        user_id                 serial,
        credit_card             integer,
        exp_date                timestamp,
        email                   varchar(30)     NOT NULL,
        PRIMARY KEY(user_id)
);
```

b)

```
CREATE TABLE trip
(
    trip_id         serial,
    user_id         serial,
    scooter_id      serial,
    start_pos       point                   NOT NULL,
    end_pos         point                   NOT NULL,
    start_time      timestamp               NOT NULL,
    end_time        timestamp               NOT NULL,
    PRIMARY KEY(trip_id),
    FOREIGN KEY(scooter_id) REFERENCES scooter(scooter_id),
    FOREIGN KEY(user_id) REFERENCES user(user_id)
);
```

c)

Method 1: insert row to database and modify row in database

Pros

-no loss of data - reliable

Cons

-frequently accessing database - slower operations

-increases database traffic

-increases user's cell phone data usage

Method 2: cache ride data locally and then insert row in database

Pros

-reduces database traffic

-saves resources needed to push new data to database

-faster operations because part of inserting a new entry is done locally

Cons

-possible loss of data if user's cell phone loses power during ride

-would prefer method 2 as there are more pros, and the cons are rare cases

Method 3: cache ride data on scooter and insert row in database

Pros

-same as all pros in both of above methods

-don't have to worry about it losing power during a ride, as it already stops users from riding it when on low battery

Cons

-more costly to implement an embedded system in all scooter units