Group 44

Topic D: Car Pooling

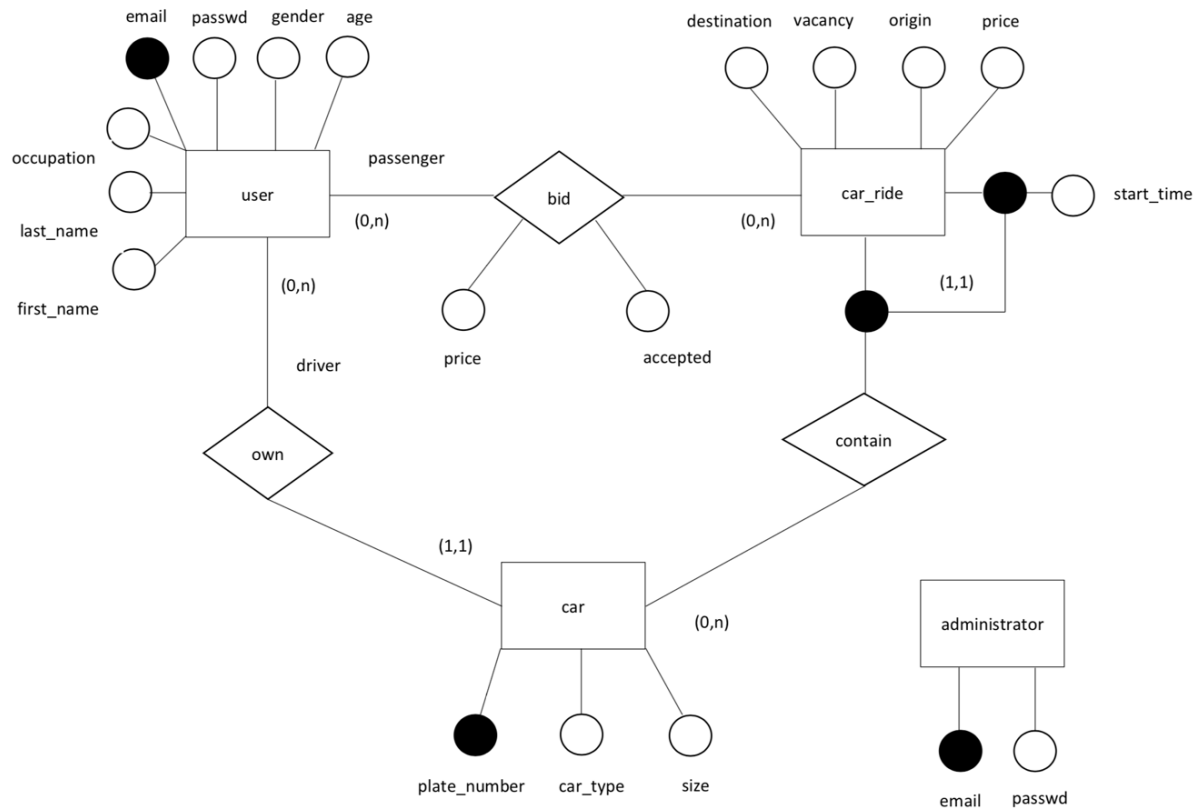# Members:

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1. Environment setting:

- **Web Server:** Apache HTTP Server
- **Server Page Language:** PHP
- **Database Management System:** PostgreSQL
- **Framework:** CodeIgniter

2. Entity – relationship Diagram:

3. Relation Schema:

```sql
CREATE TABLE users (
    email VARCHAR(32) PRIMARY KEY CHECK (email LIKE '%_@__%.__%'),
    passwd VARCHAR(32) NOT NULL CHECK (LENGTH(passwd) >= 6),
    first_name VARCHAR(32) NOT NULL,
    last_name VARCHAR(32) NOT NULL,
    gender CHAR(1) NOT NULL CHECK (gender IN ('M', 'F')),
    age INTEGER NOT NULL CHECK (age > 0),
    occupation VARCHAR(32) NOT NULL
);

CREATE TABLE cars (
    plate_number VARCHAR(8) PRIMARY KEY,
    driver_email VARCHAR(32) REFERENCES users(email),
    car_type VARCHAR(16) NOT NULL,
    size INTEGER NOT NULL CHECK (size > 0)
);

CREATE TABLE administrators (
    email VARCHAR(32) PRIMARY KEY CHECK (email LIKE '%_@__%.__%'),
    passwd VARCHAR(32) NOT NULL CHECK (LENGTH(passwd) >= 6)
);

CREATE TABLE car_rides (
    plate_number VARCHAR(8) REFERENCES cars(plate_number),
    start_time TIMESTAMP NOT NULL CHECK (start_time >=
    NOW()::timestamp),
    origin VARCHAR(32) NOT NULL,
    destination VARCHAR(32) NOT NULL,
    price NUMERIC(15,2) NOT NULL,
    vacancy INTEGER NOT NULL CHECK (vacancy >= 0),
    PRIMARY KEY (plate_number, start_time)
);

CREATE TABLE bids (
    passenger_email VARCHAR(32) REFERENCES users(email),
    plate_number VARCHAR(8),
    start_time TIMESTAMP,
    price NUMERIC(15,2) NOT NULL,
    accepted BOOLEAN NOT NULL,
    FOREIGN KEY (plate_number, start_time) REFERENCES
    car_rides(plate_number, start_time),
    PRIMARY KEY (passenger_email, plate_number, start_time)
);
```

4. Sample and Representative SQL Code

- **Aggregate Query:**

```sql
SELECT MIN(PRICE) as minimum, MAX(PRICE) as maximum,
ROUND(AVG(PRICE),2) as average, SUM(PRICE) as total
FROM bids
WHERE plate_number = '$plate_number'
AND start_time = '$start_time'
GROUP BY PLATE_NUMBER, START_TIME
ORDER BY PLATE_NUMBER, START_TIME;
```

Functionality:

Display lowest bid, highest bid, average price, sum of price for a particular car ride. In this way, the driver can obtain the meta information about a particular car ride so that he can make a more informed decision when selecting the bid to accept.

Screenshot for The Usage:

Detail of this car ride

Plate Number	Start Time	Origin	Destination	Price	Vacancy
IU52158V	2018-12-09 00:09:38	5902 Heidenreich Junctions	66280 Mac Fords	1.57	5

Meta data of this ride

Minimum Bid	Maximum Bid	Average Bid	Total Sum
5.50	9.67	7.53	60.24

- **Nested Query:**

```sql
SELECT *
FROM car_rides r, cars c
WHERE r.plate_number = c.plate_number
AND c.driver_email <> '$driver_email'
AND r.vacancy > ALL (SELECT COUNT(*)
                FROM bids b
                WHERE b.accepted = true
                GROUP BY b.plate_number, b.start_time
                HAVING b.plate_number = r.plate_number
                AND b.start_time = r.start_time)
ORDER BY start_time ASC;
```

Functionality:

This nested query is to filter and get car rides only when the number of vacancy is greater than the number of accepted bids. In this way, users can view all the car rides which still have vacancies left.

Screenshot for The Usage:

Car rides to pick

View all View those with vacancies

Plate Number	Start Time	Origin	Destination	Price	Vacancy	Details
ZR84494Y	2018-11-09 18:13:08	37151 Schmitt Summit	342 Wava Knoll Suite 037	3.58	3	View Details
ZI39759G	2018-11-09 21:13:43	9980 Herman Wall Suite 629	26633 Birdie Vista Suite 935	0.12	2	View Details
SR86451F	2018-11-10 03:45:29	1506 Fahey Ford Suite 021	6721 Parisian Ridges	0.96	3	View Details

Plate Number	Start Time	Origin	Destination	Price	Vacancy	Details
ZR84494Y	2018-11-09 18:13:08	37151 Schmitt Summit	342 Wava Knoll Suite 037	3.58	3	View Details

5. Assertions:

- **Description:**

  This trigger will keep track of all `UPDATE,` `INSERT` and `DELETE` operations on `TABLE car_rides` and store them with timestamp in `TABLE ride_audit`. This trigger will prevent drivers from cancelling a car ride booking within one day, that means the driver can only cancel the booking at least one day before the trip. In addition, this trigger also prevents drivers from giving a negative value for price and a non-positive integer for vacancy for a car ride.

  Implementation:

```
CREATE TABLE ride_audit(
     stamp timestamp NOT NULL,
     operation char(1)  NOT NULL,
     start_time timestamp without time zone NOT NULL,
     price numeric(15,2)  NOT NULL,
     vacancy integer NOT NULL);

--Triger function that does both assertion and audit
CREATE OR REPLACE FUNCTION ride_check() RETURNS trigger AS $$
     BEGIN
     IF (TG_OP = 'DELETE') THEN
     --Check if the driver is cancelling rides in advance of 1
     day
     IF  OLD.START_TIME-CURRENT_TIMESTAMP < INTERVAL '1 DAYS'
     THEN
     RAISE NOTICE 'YOU CAN ONLY CANCEL YOUR RIDES AT LEAST A
     DAY BEFORE THE RIDE!';
     ELSE
     INSERT INTO ride_audit SELECT now(), 'D', OLD.start_time,
     OLD.price, OLD.vacancy;
     RETURN OLD;
     END IF;
     ELSIF (TG_OP = 'UPDATE') OR (TG_OP = 'INSERT') THEN
     -- Check for price and vacancy input
     IF NEW.price < 0 OR NEW.price > 100 OR NEW.price IS NULL
     THEN
     RAISE NOTICE 'price cannot be less than zero or more than
     100 or null';
     ELSE
     IF NEW.vacancy <= 0 OR NEW.vacancy IS NULL THEN
     RAISE NOTICE 'vacancy cannot be zero or less or null';
     ELSE
     INSERT INTO ride_audit SELECT now(), 'A', NEW.start_time,
     NEW.price, NEW.vacancy;
     RETURN NEW;
     END IF;
     END IF;
     END IF;
     RETURN NULL;
     END; $$ LANGUAGE plpgsql;

CREATE TRIGGER ride_audit BEFORE INSERT OR UPDATE OR DELETE ON
car_rides
FOR EACH ROW EXECUTE PROCEDURE ride_check();
```

Use Case in Application

1). The driver wants to delete a ride.

2). However, since the start time of this ride is in less than one day of the current timing (9th Nov 2018), this deletion will be rejected and an error message will pop up.

3). After clicking 'OK' on the pop up window, the driver will be redirected to the original ride detail page.

- **Description:**
  This trigger checks before the UPDATE operation on TABLE bids when a driver wants to accept a bid and update its status to successful. When the number of bids is greater than the number of vacancies, the update operation will be rejected.

Implementation:

```
CREATE OR REPLACE FUNCTION bid_check() RETURNS trigger AS $$
     DECLARE NO_BIDS INTEGER;
     DECLARE NO_VACANCY INTEGER;
     BEGIN
     IF NEW.accepted = 't' THEN
     --Find number of vacancies
     SELECT C.VACANCY INTO NO_VACANCY FROM CAR_RIDES C
     WHERE C.PLATE_NUMBER = NEW.PLATE_NUMBER
     AND C.START_TIME = NEW.START_TIME;
     --Find number of bids
     SELECT COUNT(*) INTO NO_BIDS FROM BIDS B
     WHERE  B.PLATE_NUMBER = NEW.PLATE_NUMBER
     AND B.START_TIME = NEW.START_TIME AND B.ACCEPTED = TRUE;
     IF NO_BIDS < NO_VACANCY THEN
     RETURN NEW;
     ELSE
     RAISE NOTICE 'No. of accepted bids cannot be more than
     no. of vacancy';
     END IF;
     ELSE
     RETURN NEW;
     END IF;
     RETURN NULL;
     END; $$ LANGUAGE plpgsql;

   CREATE TRIGGER bid_trigger BEFORE UPDATE ON bids
   FOR EACH ROW EXECUTE PROCEDURE bid_check();
```

Use Case in Application:
   1). The vacancy of this ride is 5, and now the driver has already accepted 5 bids.

Detail of this car ride

Plate Number	Start Time	Origin	Destination	Price	Vacancy
IU52158V	2018-12-09 00:09:38	5902 Heidenreich Junctions	66280 Mac Fords	1.57	5

Meta data of this ride

Minimum Bid	Maximum Bid	Average Bid	Total Sum
5.50	9.67	7.53	60.24

Accpeted Bids for this ride

Passenger Email	His Price	Reject This Bid
predovic.carolyn@conroy.com	7.81	Reject
ithompson@morar.net	7.58	Reject
sophie.pagac@fahey.com	5.50	Reject
vonrueden.laurie@yahoo.com	7.26	Reject
betsy63@hotmail.com	9.67	Reject

2). If he accepts one more bid, this operation will be rejected and an error message will pop up.

localhost says

No. of accepted bids cannot be more than no. of vacancy!

OK
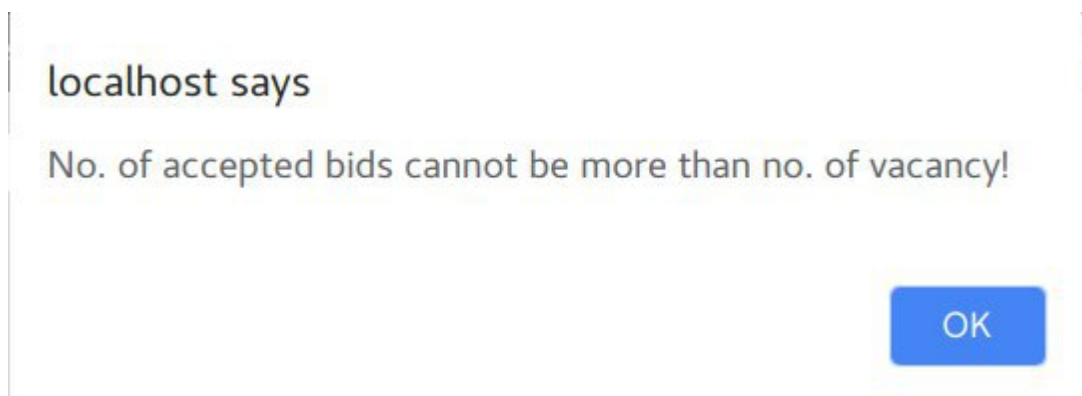
3). Clicking 'OK' will redirect driver back to the ride detail page.

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sophie.pagac@fahey.com	5.50	Reject
vonrueden.laurie@yahoo.com	7.26	Reject
betsy63@hotmail.com	9.67	Reject

6. Screenshots:

1). View my cars (after sign-in)

2). Driver views information about one car ride

3). Passenger views details of a ride and can place a bid

CARZBID   My Cars   My Bids   Find New Rides   Log Out

Detail of this car ride

Plate Number	Start Time	Origin	Destination	Price	Vacancy
ZR84494Y	2018-11-15 21:08:19	8963 Gorczany Squares	4798 Hand Villages Suite 327	2.39	3

Accpeted bids for this ride

Passenger Email	His Price
vonrueden.laurie@yahoo.com	5.91
sophie.pagac@fahey.com	6.36

Pending bids for this ride

Passenger Email	His Price
gmedhurst@bode.com	8.68
predovic.carolyn@conroy.com	8.75
betsy63@hotmail.com	6.42

Manage my mid for this Ride

Your price   Place New Bid   Cancel my bid

Check all my bids   Find other available rides